

MEMOIRS
OF THE
NATIONAL MUSEUM,
MELBOURNE.

No. 4.

PUBLISHED BY ORDER OF THE TRUSTEES.

By Authority
J. KEMP, GOVERNMENT PRINTER, MELBOURNE.

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AN INDEX TO THE LAND SHELLS OF VICTORIA.

By J. C. Cox, M.D., and C. Hedley, F.L.S.

(Plates I., II., III.)

At the invitation of the Director of the National Museum, Melbourne, we have undertaken a brief survey of the land shells of Victoria. Material from the National Museum and from the private collection of Mr. J. A. Kershaw has been confided to us. We have also drawn upon the resources of the Cox collection and of the Australian Museum, Sydney. Previous studies on the Tasmanian land shells* by the late Mr. W. F. Petterd and one of us, formed a suitable introduction to the present task.

But little attention has yet been paid to the land molluscan fauna of the State. Recently Dr. T. S. Hall wrote, "As to our land and fresh water mollusca, again, we in Victoria are sadly in the dark. Collecting has been done in the south-west of the State, but the rest is a blank."† Although the search has not been exhaustive and several species doubtless await discovery, sufficient has been done to show that Victoria is poorer in land shells than other parts of Australia. Professor Tate, in discussing this remarkable paucity, suggested that "A deluge of igneous mass must have destroyed terrestrial forms of life over the greater part of the southern region of Victoria."‡

Probably the first conchologists to work in Victoria were the naturalists of the *Astrolabe*, who, in 1826, visited Western Port and found *Helicarion cuvieri* and *Succinea australis*. In 1868, but five species, including two lately collected by Mr. G. Masters, were recorded from Victoria, in Dr. Cox's *Monograph of Australian Land Shells*. A few more species have since been added by desultory collecting. In the earliest paper written exclusively on the molluscs of Victoria, Mr. Maplestone observed the scarcity of land shells around Melbourne.§ In 1884, Professor Tate published a list and general discussion of the land shells. It was his intention to complete this preliminary statement by a more detailed study, but the increasing pressure of an active life gave him no further opportunity of resuming the subject.

An account of the land and freshwater mollusca of Castlemaine was more recently published by Mr. F. L. Billinghamurst.||

During the preparation of this report, our friend the veteran conchologist, Mr. W. F. Petterd, passed away. He took a keen interest in the subject, and had generously assisted us with specimens and information.

* Petterd and Hedley. *Rec. Austr. Mus.*, vii., 1909, pp. 283-304, pls. lxxxii.-lxxxvii.

† Hall. *Victorian Naturalist*, xxvi., 1910, p. 126.

‡ Tate. *Trans. Roy. Soc., S.A.*, iv., 1882, p. 74.

§ Maplestone. *Monthly Microscopical Journal*, viii., 1872, p. 53.

|| Billinghamurst. *Victorian Naturalist*, x., 1893, p. 61.

All known Victorian species have now been illustrated, and the present index to the subject will enable students to identify them. But it is to be remembered that smaller and rarer species yet await discovery, and that the structure of some of the small forms also requires investigation.

GROUP HETERURETHRA.

Family Succineidæ.

GENUS SUCCINEA, Draparnaud, 1801.

SUCCINEA AUSTRALIS, Ferussac.

Succinea australis, Ferussac, *Tabl. Syst.*, II., 1821, p. 27.

Id., Quoy et Gaimard, *voy. Astrolabe*, *Zool.*, II., 1832, p. 150, pl. xviii., f. 19-23.

Id., Tate, *Trans. Roy. Soc., S.A.*, IV., 1882, p. 95.

Id., Billingham, *Viet. Nat.*, X., 1893, p. 62.

Id., Petterd and Hedley, *Rec. Austr. Mus.*, VII., 1909, p. 283.

Habitat.—Western Port (Astrolabe), Melbourne (Petterd), Castlemaine and Harcourt (Billingham), Stawell (Australian Museum), Frankston and Wimmera District (Kershaw).

GROUP SIGMURETHRA.

SUB-GROUP HOLOPODA.

Family Acavidæ.

GENUS PANDA, Albers, 1860.

PANDA ATOMATA, Gray, var. KERSHAWI, Brazier.

Bulinus kershawi, Brazier, *Proc. Zool. Soc.*, 1871, p. 641.

Id., Tate, *Trans. Roy. Soc., S.A.*, IV., 1882, p. 75.

Panda atomata, var. *kershawi*, Hedley, *Rec. Austr. Mus.*, II., 1892, p. 31, pl. v., f. 9.

Habitat.—Snowy River, Gippsland (W. Kershaw). The species is unknown between the Hunter and the Snowy rivers. This is the most remarkable instance of discontinuous distribution recorded among Australian land mollusca.

Family Helicidæ.

GENUS CHLORITIS, Beek, 1837.

CHLORITIS VICTORIÆ, Cox.

(Plate I., figs. 1, 2.)

Helix victoriæ, Cox, *Monogr. Austr. Land Shells*, 1868, p. 37, pl. xii., f. 5.

Helix brunonia, Johnston, *Proc. Roy. Soc., Tasm.*, 1887, p. 75.

Chloritis brunonia, Petterd and Hedley, *Rec. Austr. Mus.*, VII., 1909, p. 285, pl. lxxii., f. 2, 3, 4.

After *Panda* and *Paryphanta*, this is the largest Victorian snail. When deprived of its characteristic bristly epidermis, it seems transformed into another species. It is obvious that this is what Professor Tate doubtfully recorded* from Fernshaw as *H. mansueta*, Pfr. The latter is a Queensland shell bearing a general resemblance to *C. victoriæ* in size, form, and colour. But *C. mansueta* may be distinguished in all stages of growth by the broader umbilicus and sparser bristles. Professor Tate's record (op. cit.) of *H. brevipila*, Pfr., from Melbourne is evidently again a misquotation for *C. victoriæ*. During the preparation of the *Revised Census of the Terrestrial Mollusca of Tasmania*, Mr. W. F. Petterd was not quite satisfied of the identity of *C. brunonia* with *C. victoriæ*. In the last letter we received from him, he had decided that they were the same. This decision is here adopted. The species seems to be common and widely distributed. We have received specimens from the following places:—Western Port (type locality, Masters and Petterd), Victorian Alps (French), Jan Juc (Kershaw), Forrest (Steel), Lorne (Pritchard), Loutit Bay (Kershaw), and Cape Otway (Petterd). Beyond Victoria it is only known from King Island, and from Mt. Kosciusko.

SUB-GROUP AGNATHOMORPHA.

Family Rhytididæ.

GENUS RHYTIDA, Albers, 1860.

RHYTIDA RUGA, Cox.

Helix ruga, Cox, in *Legrand Coll., Monog. Tasm. Land Shells* 1871, sp. 24, pl. i., f. 5.

Id., Tryon, *Man. Conch.*, III., 1887, p. 264, pl. 37, f. 93–95.

Rhytida ruga, Mollendorff and Kobelt, *Conch. Cab. Agnatha*, 1903, p. 29, pl. v., f. 10–12.

Id., Petterd and Hedley, *Rec. Austr. Mus.*, VII., 1909, p. 286.

Helix exoptata, Tate, *Trans. Roy. Soc., S.A.*, IV., 1882, p. 75.

This species is generally distributed throughout the State. It was first recorded from Victoria by Mr. W. F. Petterd, who remarked that "specimens from the Dandenong Range, Victoria, are identical with those from the northern portion of this island"†, i.e., Tasmania.

Professor Tate appears to have considered, on the contrary, that mainland shells should be specifically distinguished from the Tasmanian, and proposed to name the Victorian form, which he recorded from Sale, Cape Otway, and Fernshaw, as *Helix exoptata*, but he never published a formal description or noted differential characters.

The size principally distinguished *R. ruga* from its northern relations, and it may prove a dwarf of a widespread species which, in different parts of Australia, has received different names. We

* Tate. *Trans. Roy. Soc., S.A.*, iv., 1882, p. 75.

† Petterd. *Monogr. Tasm. Land Shells*, 1879, p. 7.

would suggest comparison with *Helix georgiana*, Quoy and Gaimard* from King George's Sound, Western Australia; with *Zonites walkeri*, Gray,† collected 70 miles from Fort Macquarie, New South Wales, in company with *P. atomata*; with *Helix capillacea*, Ferussac,‡ collected by Peron at Port Jackson, New South Wales; with *Nanina fricata*, Gould§, collected by Drayton in Illawarra, New South Wales; and with *Helix gawleri*, Brazier|| from the Mount Lofty Range, South Australia.

GENUS PARYPHANTA, Albers, 1850.

PARYPHANTA ATRAMENTARIA, Shuttleworth.

Nanina atramentaria, Shuttleworth. *Mittheil. Naturf. Gesell. Bern*, 1852, p. 194.

Id., Fischer, *Notitiae malacol.*, II., 1877, p. 5, pl. i., f. 2.

Helix atramentaria, Cox, *Monogr. Austr. Land Shells*, 1868, p. 5, pl. iii., f. 2.

Helicarion atramentaria, Ten. Woods, *Proc. Linn. Soc., N.S.W.*, III., 1879, p. 124, pl. xii., f. 2, 2a.

Id., Tate, *Trans. Roy. Soc., S.A.*, IV., 1882, p. 75.

Habitat.—Port Phillip (Shuttleworth), Mount Arnold and Bendigo (Cox), Fernshaw (Tate), and Dandenong Range (Tenison Woods).

PARYPHANTA COMPACTA, SP. NOV.

(Plate I., Figs. 3, 4, 5.)

Shell depressedly globose, narrowly perforate, thin, whorls four. Colour brown, deepening on the last whorl to black and on the second whorl passing into straw yellow. The epidermis, in which the colour resides, is thick and very glossy. Sculpture: On the earlier whorls are oblique wrinkles, on the later a few irregular growth lines occur. Suture deeply impressed. Spire slightly elevated, base well rounded, umbilicus a narrow perforation. Aperture very oblique, slightly descending above, sinuate at the periphery, left insertion a little reflected over the perforation. Margins united by a callus which within the throat is purple and finely granulated. This callous lining does not extend to the very edge of the aperture, but leaves a narrow epidermal margin.

Maj. diam., 24 mm., min. diam., 19 mm.; height, 17 mm.

Type presented to the Australian Museum by Dr. J. C. Cox, collected by Mr. A. D. Hardy in débris and rotten wood at Smithers Creek, Otway Ranges. Three other specimens collected by Mr. Kershaw at the Erskine Falls, Loutit Bay, differ by being smaller, namely:—Maj. diam., 20 mm.; min. diam., 15 mm.; height, 14 mm., and by the spire whorls being almost flat.

* Quoy et Gaimard. *Voy. Astrolabe*, Zool., ii., 1832, p. 129, pl. x., f. 26–30. *Id.*, Ferussac et Deshayes, *Hist. Nat. Moll. Terr.* (no date), i., p. 88, pl. 84, f. 3–4. *Vitrea georgiana*, Smith, *Proc. Mal. Soc.*, i., 1894, p. 87.

† Gray. *Proc. Zool. Soc.*, 1834, p. 63.

‡ Ferussac. *Tabl. Syst.*, 1821, p. 40, *nom. nud.* *Id.*, *Hist.*, pl. 82, f. 5 (no date). *Id.*, Pfeiffer, *Conch. Cab. Helix*, 1846, p. 65, pl. 83, f. 7, 9.

§ Gould. *U.S. Expl. Exped.*, xii., 1852, p. 32, pl. v., f. 71 a, b.

|| Brazier. *Proc. Zool. Soc.*, 1872, p. 618. *Rhytida gawleri*, Kobelt and Moellendorff, *Conch. Cab. Agnatha*, 1903, p. 37, pl. 7, f. 12–14.

The novelty is nearest in the genus to *P. atramentaria*, but with as many whorls in about half the diameter, the whorls increase more slowly, the last whorl is proportionately smaller, the perforation narrower, and the whole shell more globose. In size it resembles the Tasmanian *P. fumosa*, but the whorls of *compacta* are wound more nearly in the same plane and increase less rapidly. It seems confined to the southern part of the State, while *atramentaria* inhabits the centre.

SUB-GROUP AULACOPODA.

Family Endodontidæ.

GENUS ENDODONTA, Albers, 1850.

ENDODONTA ALBANENSIS, Cox.

Helix albanensis, Cox, *Proc. Zool. Soc.*, 1867, p. 723.

Id., *Mon. Austr. Land Shells*, 1868, p. 15, *pl. iv.*, f. 2.

Endodonta albanensis, Pilsbry, *Man. Conch.*, VIII., 1892, *pl. xxxvii*, f. 43-46; IX., 1894, p. 34.

Id., Hedley, *Proc. Malac. Soc.*, I., 1895, p. 260.

Id., Petterd and Hedley, *Rec. Austr. Mus.*, VII., 1909, p. 288.

Helix stanleyensis, Tate, *Trans. Roy. Soc., S.A.*, IV., 1882, p. 75.

Habitat.—Fernshaw (Petterd), Wimmera (Australian Museum), Gippsland and Wilson's Promontory (Kershaw).

ENDODONTA FUNEREA, Cox.

Helix funerea, Cox, *Monogr. Austr. Land Shells*, 1868, p. 16, *pl. iii.*, f. 1.

Endodonta funerea, Hedley, *Rec. Austr. Mus.*, II., 1896, p. 104.

This species appears to be generally distributed. We now record it from Frankston (Australian Museum), Burrumbeet (Tate), Bairnsdale (Kershaw), and Mount Shadwell (Whan).

ENDODONTA JULOIDEA, Forbes.

Helix juloidea, Forbes, *voy. Rattlesnake, Append.*, p. 379, *pl. ii.*, f. 4.

The type of this species was found at Port Molle, in tropical Queensland, so that the shell is very unlikely to occur also in Tasmania or Victoria. Professor Tate recorded (*Trans. Roy. Soc., S.A.*, IV., 1882, p. 75) *juloidea* from Victoria, but specimens which he so determined prove to be *E. funerea*. The Melbourne shell which Tenison Woods (*Proc. Linn. Soc., N.S.W.*, III., 1879, p. 125) called *juloidea* was probably *E. albancensis*.

ENDODONTA MURRAYANA, Pfeiffer, var. SUBMURRAYANA, var. nov.

(Plate I., Figs. 6, 7, 8.)

Helix murrayana, Pfeiffer, *Proc. Zool. Soc.*, 1863, p. 527.

Id., Angas, *op. cit.*, p. 521, and *Journ. of Conch.*, I., 1876, p. 134.

Id., Cox, *Monog. Austr. Land Shells*, 1868, p. 14, *pl. xix.*, f. 10, 10a, 10b.

E. murrayana is related to *E. funerea*, than which it is larger, flatter, with wider umbilicus, and more distant radial lamellæ. It has not hitherto been recorded from Victoria. Some examples from Geelong, collected by Dr. T. S. Hall, have a narrower umbilicus and weaker closer radial riblets than typical shells from the Murray cliffs. For these we adopt the varietal name of *submurrayana*, which Professor Tate proposed to bestow when he had this form under consideration. A specimen in the Australian Museum here figured is, major diam., 6·5 mm. ; minor diam., 5 mm. ; and height, 3·5 mm.

ENDODONTA RETIPORA, Cox, var. MELBOURNENSIS, Cox.

Helix retipora, Cox, *Proc. Zool. Soc.*, 1867, p. 39.

Id., *Mon. Austr. Land Shells*, 1868, p. 21, pl. vii., f. 8.

Id., *Billinghurst, Vict. Nat.*, X., 1893, p. 62.

Helix melbournensis, Cox, *Mon. Austr. Land Shells*, 1868, p. 22, pl. xii., f. 10.

Id., *Tate, Trans. Roy. Soc.*, IV., 1882, p. 75.

Endodonta melbournensis, Hedley, *Proc. Linn. Soc., N.S.W.*, XXVII., 1902 (1903), p. 604, pl. xxxi., f. 16, 17.

The Victorian form is rather more finely sculptured than the South Australian, but the difference is not constant enough for specific distinction.

Habitat.—Melbourne (Masters), Fernshaw (Petterd), Castlemaine (Billinghurst), Gippsland and Wimmera (Australian Museum), Mount Macedon, Dandenong Range, and Western Port (Kershaw).

ENDODONTA TAMARENSIS, Petterd.

Helix tamarensis, Petterd, *Mon. Tasm. Land Shells*, 1879, p. 30.

Id., *Tate, Trans. Roy. Soc., S.A.*, IV., 1882, p. 75.

Charopa tamarensis, *Billinghurst, Vict. Nat.*, X., 1893, p. 62.

Endodonta tamarensis, Hedley, *Proc. Linn. Soc., N.S.W.*, XXVII., 1903, p. 605, pl. xxxi., f. 18, 19, 20.

Id., *Petterd and Hedley, Rec. Austr. Mus.*, VII., 1909, p. 291.

Habitat.—Burrumbeet (Tate), Mount Franklin (Billinghurst).

GENUS CYSTOPELTA, Tate, 1881.

CYSTOPELTA PETTERDI, Tate.

Cystopelta petterdi, Tate, *Proc. Roy. Soc., Tasm.*, 1880 (1881), p. 17.

Id., *Hedley, Proc. Linn. Soc., N.S.W.*, (2), V., 1890, pp. 44–46, pl. i. ; and *Rec. Austr. Mus.*, II., 1896, p. 102.

Id., *Petterd and Hedley, Rec. Austr. Mus.*, VII., 1909, p. 292.

Habitat.—Ballarat (Musson), Loch (Frost).

GENUS LAOMA, Gray, 1849.

LAOMA MORTI, Cox.

Helix morti, Cox, *Ann. Mag. Nat. Hist.* (3), XIV., 1864, p. 182.

Id., *Monog. Austr. Land Shells*, 1868, p. 21, pl. xi., f. 13.

Id., Tate, *Trans. Roy. Soc., S.A., IV.*, 1882, p. 75.

Laoma morti, Petterd and Hedley, *Rec. Austr. Mus., VII.*, 1909, p. 294.

Helix hobarti, Tate, *Trans. Roy. Soc., S.A., IV.*, 1882, p. 75.

Flammulina retinodes, Tate, *Horn Exp., II.*, p. 187, p. xvii., f. 4.

Habitat.—Mount Eliza (Pritchard), Jan Juc (Kershaw).

Professor Tate has quoted other Victorian localities, but since that of Melbourne (on the authority of Petterd) refers to *L. mucoides*, we regard them as uncertain.

LAOMA MUCOIDES, Tenison Woods.

(Plate II., Figs. 9, 10, 11, 12.)

Helix mucoides, Tenison Woods, *Proc. Linn. Soc., N.S.W., III.*, 1879, p. 125, pl. iii., f. 5, 5a.

Id., Tate, *Trans. Roy. Soc., S.A., IV.*, 1882, p. 75.

L. mucoides is closely related to *L. morti*, Cox, in form and sculpture, and has in the past been mistaken for it. *L. mucoides* has an extra whorl, and is larger, darker, and more solid. In *L. morti* the radial lamellæ are better developed. One of Tenison Woods' type specimens here figured is 2·8 mm. maj. diam., 2·35 mm min. diam., and 1·35 mm. in height. The type locality is Melbourne.

LAOMA PENOLENSIS, Cox.

Helix penolensis, Cox, *Proc. Zool. Soc.*, 1867, p. 724.

Id., *Monogr. Austr. Land Shells*, 1868, p. 8., pl. xi., f. 12.

Helix pictilis, Tate, *Proc. Linn. Soc., N.S.W., II.*, 1878, p. 290.

Laoma pictilis, Petterd and Hedley, *Rec. Austr. Mus., VII.*, 1909, p. 294, pl. lxxxvi., f. 35-37.

Cape Northumberland, the type locality of *H. pictilis*, is but a short distance from Penola, where the type of *H. penolensis* was found. Professor Tate distinguished *H. pictilis* from the Penola shell by "its coarser ribbing, its colouration, and the presence of transverse striæ." The first and second characters are variable, and we find that the type of *H. penolensis* in the Cox collection has microscopic spiral striæ. So that *H. pictilis* may be safely reduced to a synonym of *H. penolensis*.

Found at Port Fairy, by the Rev. W. T. Whan; near Melbourne and at Oberon Bay, Wilson's Promontory, by Mr. J. A. Kershaw; at Lorne, by Dr. G. B. Pritchard.

GENUS FLAMMULINA, von Martens, 1873.

FLAMMULINA EXCELSIOR, Hedley.

Flammulina excelsior, Hedley, *Rec. Austr. Mus., II.*, 1896, p. 103, pl. xxviii., f. 2-4.

The type of this species occurred on Mount Kosciusko. It is likely that the unlocalized Victorian specimen obtained by Professor Spencer, and referred to in the original description, came from some neighbouring alpine district.

FLAMMULINA FORDEI, Brazier, var. M'COYI, Petterd.

(Plate II., Figs. 13, 14, 15.)

Helix fordei, var. *m'coyi*, Petterd, *Monogr. Tasm. Land Shells*, 1879, p. 14.

Helix m'coyi, Tate, *Trans. Roy. Soc., S.A., IV.*, 1882, p. 75.

? *Helix fernshawensis*, Petterd, *Journ. of Conch.*, II., 1879, p. 355.

Id., *Monogr. Tasm. Land Shells*, 1879, p. 15.

Id., Tate, *Trans. Roy. Soc., S.A., IV.*, 1882, p. 75.

The type which Mr. Petterd presented to the Australian Museum, and which measures, maj. diam. 7.5 mm., min. diam. 6 mm., height 5.5 mm., is here figured. The *H. fernshawensis* is regarded by us as a lost species, for Mr. Petterd had retained no specimen of it, neither is an example preserved in the Tate collection, as Dr. Verec kindly informs us. We have taken advantage of Professor Tate's suggestion, that *H. fernshawensis* is an immature *H. m'coyi*, to suppress it as a synonym.

Habitat.—Dandenong Range (Petterd), Fernshaw (Tate), Don River (National Museum), Upper Yarra (Kershaw).

FLAMMULINA ELENESCENS, SP. NOV.

(Plate III., Figs. 16, 17, 18.)

Shell subdiscoidal, thin, spire slightly elevated, base flattened and broadly umbilicated. Colour ochraceous-buff, with a few faint radial streaks of brown. Whorls five, slowly increasing, parted by deeply impressed sutures. Sculpture: First whorl and a half smooth, about the ante-penultimate whorl the shell is ornamented with fine close even thread-like radials at the rate of about a hundred to a whorl, this sculpture is also visible within the umbilicus. On the later whorls this sculpture gradually vanishes, so that their smoothness is only broken by fine and rather irregular growth lines. There is no spiral sculpture. Umbilicus about a quarter of the shell's diameter, broad and open, exposing all the earlier whorls. Maj. diam., 6.7 mm.; minor diam., 5.4 mm.; height, 2.9 mm.

Habitat.—Merri Creek (Tenison Woods). Type in the Australian Museum.

In general appearance the novelty is like *F. diemenensis* and *F. marchiana*, between which it is intermediate in size. The break in sculpture of *F. elenescens* readily distinguishes it.

SUB-GENUS ALLODISCUS, Pilsbry, 1892.

Obs.—The following species are assigned to this sub-genus by reason of their spirally striated nuclear whorls.

FLAMMULINA OTWAYENSIS, Petterd.

Helix otwayensis, Petterd, *Mon. Tasm. Land Shells*, 1879 (April), p. 39.

Id., *Journ. of Conch.*, II., 1879 (December), p. 356.

Endodonta otwayensis, Hedley, *Proc. Linn. Soc., N.S.W.*, XXVII., 1903, p. 605, pl. xxix., f. 10, 11, 12.

Habitat.—Cape Otway (Petterd), Fern Tree Gully (Hall), Fernshaw (Kershaw).

FLAMMULINA SUBDEPRESSA, Brazier.

Helix subdepressa, Brazier, *Proc. Zool. Soc.*, 1871, p. 641.

Endodonta subdepressa, Hedley, *Proc. Linn. Soc., N.S.W.*, XXVII., 1903, p. 605, pl. xxxi., f. 13, 14, 15.

Helix dandenongensis, Petterd, *Journ. of Conch.*, II., 1879, p. 355.

Id., Tate, *Proc. Roy. Soc., S.A.*, IV., 1882, p. 75.

Habitat.—Snowy River and Fernshaw (Kershaw), Dandenong Range (Petterd), Oakleigh (French), Gembrook (Coghill), Emerald District (Jarvis).

FLAMMULINA MERACA, SP. NOV.

(Plate III., Figs. 19, 20, 21.)

Shell small, very thin, subdiscoidal spire slightly elevated, base narrowly perforated. Colour pure white. Whorls three and a half, parted by deep sutures and rather rapidly increasing. Sculpture: The protoconch, of one and a half whorls, is finely spirally striated and ends abruptly, the adult shell is perpendicularly traversed by fine evenly spaced radial riblets, amounting on the last whorl to about two hundred, between the riblets are a few very minute radial threads. Aperture lunate-ovate, columella slightly reflected. Inner lip overlaid by a callus spread in advance over the riblets of the preceding whorl. Base rounded, umbilicus narrow, about one-fifteenth of the major diameter. Height, 2 mm.; maj. diam., 4 mm.; minor diam., 3 mm.

Habitat.—Dandenong Range, numerous specimens (Kershaw), and Fernshaw (Petterd). Type from the Dandenongs in the National Museum.

The novelty is nearest related to *F. nivea*, Hedley,* from Kosciusko, which differs in the microscopic details of the sculpture, is more closely coiled, and has a sunken instead of an elevated spire.

It is possible that this may be the species recorded from Fernshaw as *Helix garthii*, Petterd, M.S. by Professor Tate.†

* Hedley. *Rec. Austr. Mus.*, ii., 1896, p. 103, pl. xxiii, f. 2-4.

† Tate. *Trans. Roy. Soc., S.A.*, iv., 1884, p. 75.

Neither the collection of Professor Tate nor of Mr. Petterd now contains this shell, so that the name must be written off as unrecognisable.

Family Zonitidæ.

GENUS *HELICARION*, Ferussac (em.), 1821.

HELICARION CUVIERI, Ferussac.

Helicarion cuvieri, Ferussac, *Tabl. Syst.*, 1821, p. 20.

Id., Petterd and Hedley, *Rec. Austr. Mus.*, VII., 1909, p. 301.

Vitrina nigra, Quoy et Gaim., *voy. Astrolabe, Zool.*, II., 1832, p. 135, pl. xi., f. 8, 9.

Id., Tate, *Trans. Roy. Soc., S.A.*, IV., 1882, p. 75.

Vitrina verreauxii, Pfeiffer, *Proc. Zool. Soc.*, 1849, p. 132.

Habitat.—Western Port (Astrolabe), Fernshaw, Sale, and Cape Otway (Petterd), Jumbunna, South Gippsland (Kitson).

The following land mollusca have been introduced into Victoria from Europe :—*

Limax maximus, Linne.

Limax flavus, Linne.

Agriolimax agrestis, Linne.

Agriolimax lævis, Muller.

Milax gagates, Draparnaud.

Vitrea cellaria, Muller.

Zonitoides nitidus, Muller.

Helicella caperata, Montagu.

Helicella barbara, Linne.

Helix aspersa, Muller.

Helix pisana, Muller.

* Musson.—*Proc. Linn. Soc.* (2), v., 1890, pp. 883–896.
x., 1903, pp. 352–367.

Woodward.—*Journ. of Conch.*

EXPLANATION OF PLATES.

PLATE I.

Fig. 1.—Bristles and (Fig. 2) hair scars of *Chloritis victoriæ*. Cox.
Much magnified.

Figs. 3, 4, 5.—Various aspects of *Paryphanta compacta*. Cox and
Hedley. Enlarged.

Figs. 6, 7, 8.—Various aspects of *Endodonta murrayana*. Pfeiffer.
Var. *submurrayana*. Cox and Hedley. Enlarged.

PLATE II.

Figs. 9, 10, 11.—Various aspects of *Laoma mucoides*. Tenison
Woods. Enlarged.

Fig. 12.—Sculpture of *L. mucoides*. Much magnified.

Figs. 13, 14, 15.—Various aspects of *Flammulina fordei*. Brazier.
Var. *m'coyi*. Petterd. Enlarged.

PLATE III.

Figs. 16, 17, 18.—Various aspects of *Flammulina elenescens*. Cox
and Hedley. Enlarged.

Figs. 19, 20, 21.—Various aspects of *Flammulina meraca*. Cox and
Hedley. Enlarged.

ON SOME TYPES OF LEPIDOPTERA IN THE NATIONAL MUSEUM, MELBOURNE.

By A. Jefferis Turner, M.D., F.E.S.

In a little work published in 1869 under the title *Characters of Undescribed Lepidoptera Heterocera*, by the late Mr. Francis Walker, F.L.S., are the descriptions of a number of species which it is desirable to identify as far as possible. The work commences with 102 species described as new from the collection of T. Norris, Esq. Of these, eight are stated to have been taken at Moreton Bay, but a large proportion of the species are without locality, so that it is quite possible that there are more Australian types among them. Whether these types are still in existence I do not know, but I believe I have seen some of them in the British Museum. I have made an attempt to identify the Australian forms from the descriptions.

- 12. *Lithosia remota* is a synonym of *Lexis nitens*, Wlk.
- 24. *Turriga invasa* is probably a variety of *Olene mendosa*, Hb.
- 26. *Entometa adusta* is a synonym of *Pinara metaphaea*, Wlk.
- 32. *Doratifera congrua* is a synonym of *Susica alphaea*, Fab.
- 33. *Mecytha antiqua* I have not been able to identify.
- 37. *Antheræa insignis* is a synonym of *Copaxa janetta*, White.
- 81. *Piana lignificta*, and 88. *Hypopyra fusifascia*, I am not able to identify.

The next instalment is headed "The following fifty-one species inhabit Australia, and are in the National Museum at Melbourne." Through the courtesy of Mr. J. A. Kershaw, the Curator, I have had the opportunity of carefully examining these types. They are kept in a drawer by themselves, and have been well cared for, but bear the traces of previous ill-usage. Mr. Kershaw informs me that they were placed in this drawer from a box, which contained a label saying that they were "received in bad condition," probably from damage in the post. Beneath each type is an M.S. name, probably in Walker's handwriting, and these names correspond to the descriptions in print. Two of the types are missing, but one of these I have identified to my own satisfaction from the description. The remaining forty-nine are all Victorian species, or at least forty-seven of them, which I have determined. Of the two remaining, one is an obscure species of the genus *Anthela*, which will probably be identified some day; the other is represented by thorax and hind wings only, and all that can be said of it is that it is a species of *Agriophara*. Forty-eight of the species are now accounted for, and of these forty-eight names, thirty-one are

synonyms, most of the species having been previously named by Walker himself. There remain seventeen names which must, I think, be adopted. Most of these have been since described by other authors, who had not the opportunity of examining Walker's types. Of the four generic names proposed, none are valid.

I should not have been able to obtain results so complete if it had not been for the generous assistance of Mr. J. A. Kershaw and Mr. Geo. Lyell. The latter went through the types before my arrival, and left me a box of examples from his own collection, which he had compared and identified with them. The former supplemented these with other examples from the Museum collection. Having satisfied myself of the correctness of the identifications, and in some instances this required special care, I was able to study the loaned examples at leisure after my return to Brisbane.

My detailed results are as follow :—

1. *Eterusia auroatra*.—The type is unfortunately missing. The description applies to some species of unusually distinct appearance, and should be recognisable, but at present I cannot identify it with any Australian species known to me.
2. *Eutane partita*.—This is a good species correctly identified by Sir Geo. Hampson, and described as *Thallarcha partita* (Cat. Lep. Phal. II., p. 503). There are several allied and very similar species; this one is best distinguished by its deep orange-ochreous ground-colour, and by a fuscous spot in cilia of hind wings below middle. It appears to be very rare in collections; a specimen lent me from the National Museum bears the locality label Spring Vale, Victoria. I have taken a series, which I refer to this species, at Glen Innes, New South Wales, in October.
3. *Castula binotata* = *Castulo doubledayi*, Newm. = *Cluaea rubricosta*, Wlk. The type of *binotata* is a variety occasionally met with in which the termen and cilia of hind wings are ochreous, with a narrow dark-fuscous subterminal line.
4. *Orgyia semifusca* is, I think, a good species, but cannot be referred to this genus. The ♂ agrees structurally with *Porthesia*, but Mr. Kershaw has lent me a ♀ from the National Museum which strikingly resembles a ♀ *Orgyia*. I propose to make this species the type of a new genus *Ocybola*, and both genus and species will be described below.
5. *Teara luctipennis* is a synonym of *Oenosanda boisduvalii*, Newm. ♂. This species is sexually dimorphic.

6. *Entometa despecta*.—The type is a ♂ and should be easily recognised; the hind wings are blackish and much darker than the fore wings, which are brown, densely irrorated with orange-ochreous. I have this species under the name of *Entometa obscura*, Wlk. Walker's types of this genus require to be elucidated, the ♀♀ of many of the species are very similar, and unfortunately some of the types are ♀.
7. *Entometa ignobilis* belongs to the *Psychidae*, and has been correctly identified by Meyrick and Lower (Trans. Roy. Soc. S.A., 1897, p. 197), who redescribe it as *Clania ignobilis*.
8. *Ptilomacra antiqua* is a synonym of *Ptilomacra senex*, Wlk.
9. *Opsirrhina punctilinea* is a synonym of *Pinara divisa*, Wlk. ♀.
10. *Tolyte subnotata* is a good species so far as I know. It is closely allied to *trimacula*, Wlk., which Mr. Lyell tells me is the ♀ of *Crexa punctigera*, Wlk. I suspect that my *Crexa hyaloëssa* may be the ♂ of *subnotata*.
11. *Hepialus fasciculatus* is a synonym of *Oncoptera intricata*, Wlk.
12. *Leucania adjuncta* is a synonym of *Cirphis ciliata*, Wlk. It is not the same as the species described by Hampson as *Cirphis adjuncta* (Cat. Lep. Phal. V., p. 489), for which I propose a new name below.
13. *Mamestra confundens* is a synonym of *Dasygaster hollandiæ*, Gn.
14. *Agrotis costalis* is a synonym of *Caradrina tortisigna*, Wlk.
15. *Agrotis transversa* = *Euxoa porphyricollis*, Gn.
16. *Anchoscelis bicolor* = *Agrotis compta*, Wlk.
17. *Orthosia deprivata* is a slightly darker example of *Agrotis compta*, Wlk.
18. *Euplexia mamestroides* has been described by me as *Prometopus poliophracta*. (Trans. Roy. Soc. South Australia, 1908, p. 57.) Hampson identifies this species as *Omphaletis exundans*, Gn. (Cat. Lep. Phal. VIII., p. 377.) It is very similar in markings to *Caradrina instipata*, Wlk.
19. *Xylina saxatilis* = *Ectopatria subrufescens*, Wlk.
20. *Pantydia canescens* = *Pantydia diemeni*, Gn.
21. *Samea distractalis* = *Nacoleia rhoeonalis*, Wlk. The type is mangled, but recognisable.
22. *Ebulea gavisalis* has been since described as *Mecyna rhodochrysa*, Meyr.
23. *Stenopteryx corticalis* = *Nomophila noctuella*, Schiff.
24. *Idiodes inornata* = *Idiodes apicata*, Gn.
25. *Azelina inordinata* = *Mnesampela privata*, Gn.

26. *Azelina biplaga* is a good species, which has been re-described as *Metrocampa glaucias*, Meyr.
27. *Passa pygaeroides* = *Smyriodes aplectaria*, Gn.
28. *Monoctenia decora* is a pale variety of *Monoctenia vinaria*, Gn.
29. *Arnissa simplex* belongs to the genus *Anthela* (*Lymantriadae*). The type is an obscure ♀, and I was not able to identify the species.
30. *Tephrosia scitiferata* = *Selidosema mundifera*, Wlk.
31. *Tephrosia fulgurigera* = *Selidosema excursaria*, Gn., a variety with thickened dark-fuscous lines on wings.
32. *Asthena vexata* = *Euchoeca rubropunctaria*, Wlk.
33. *Macaria comptata* = *Diastictis australiaria*, Gn.
34. *Larentia approximata* has been since described as *Phrissogonus pyretodes*, Meyr. The type is a ♂ and rather darker than usual.
35. *Larentia gelidata* (Walker's M.S. label reads "*Larentia algidata*") is a ♀ example of *Xanthorhoe subiduria*, Gn.
36. *Oesymna stipataria* is a ♀ example of *Microdes squamulata*, Gn.
37. *Eupithecia destructata* has been since described as *Phrissogonus catastreptes*, Meyr. In this instance only I had no example to compare with the type, but I am confident of my identification.
38. *Acrobasis subcultella* = *Epipaschia nauphialis*, Wlk.
39. *Hypata moderatella* = *Chlenias arietaria*, Gn.
40. *Dichelia ricariana* = *Cacæcia postrittana*, Wlk.
41. *Sperchia intractana* is, I believe, the species described by Meyrick under the name of *Capua obfuscata*.
42. *Tinea annosella* has been since described as *Xysmatodona saxosa*, Meyr.
43. *Tinea arctiella* has been since described as *Lepidoscia comochora*, Meyr.
44. *Tinea nivibractella* is a good species of the genus *Monopis*, Hb. I give a full description below.
45. *Tinea intritella* has been redescribed as *Phloeopola exarcha*, Meyr.
46. *Hyponomeuta* ? *viduata* is a good species which may be provisionally referred to the genus *Xylorycta*. Besides the type there are three examples in the National Museum, all imperfect and without palpi. (Localities: Melbourne and Kewell, Vic.)
47. *Chimabacche saxipennella*. This is, I have no doubt, a species of the genus *Agriophara*, but as the type has now no fore wings, palpi, antennæ, nor abdomen, it would be rash to identify it more particularly.

48. *Gelechia improbella* is a species of the genus *Eulechria*. I have not been able to identify it with any of Mr. Meyrick's descriptions, but it is a species difficult to recognise. I describe it below.
49. *Gelechia gemmipunctella* is represented by a single fore wing only, but this is sufficient to identify it with *Glyphipteryx atristiclla*, Zel. I consider *G. chrysolithella*, Meyr., to be the same species, the colour of the hind wings being variable in different localities.
50. *Oecophora impletella*. The type is missing, but from the description I have no hesitation in identifying this with *Philobota herodiella*, Feld. As vol. ii. of the *Reise Novara* was published in 1874, Walker's name has the priority.
51. *Cryptolechia scitipunctella* is a synonym of *Hoplitica repandula*, Zel.

In the National Museum is the Curtis collection of British insects. Among them I examined *Arcturus sparshallii*, Curt., which is undoubtedly the same as *Trichetra stibosma*, Butl. Mr. Lyell informs me that he considers this to be a varietal form of *Trichetra melanosoma*, Wlk. How this Australian insect came to be ascribed to Great Britain must remain a mystery.

In the Museum Library I had an opportunity of examining Donovan's *Insects of New Holland*. His *Tinea strigatella* (Plate 40) is the same as *Philobota chrysopotama*, Meyr. The only discrepancy is that the ground-colour is figured purple, but comparison with the description shows that this is an error of the colourist.

GENUS OCYBOLA, NOV.

ὠκυβόλος, quick-darting.

Head and thorax densely long-haired. Tongue minute. Palpi moderate, porrect, hairy. Antennæ in ♂ with two rows of long pectinations to apex, in ♀ shortly bipectinate. Legs hairy, posterior tibiæ with two pairs of spurs. Abdomen without crests. Fore wings with 2 from middle, 3 from before angle, 4 and 5 from angle, 6 connate with 7, 8, 9, 10, which are stalked, 10 arising beyond 7, no areole. Hind wings with 5 absent, 6 and 7 stalked. Wings in ♀ rudimentary.

OCYBOLA SEMIFUSCA, Wlk.

♂, 28 mm. Head, thorax, and palpi dark-fuscous mixed with whitish-ochreous hairs. Antennæ whitish-ochreous, pectinations and inner surface dark-fuscous. Abdomen dark-fuscous, tuft and underside orange-ochreous. Legs ochreous mixed with dark-fuscous. Fore wings triangular, costa gently arched, apex obtusely rounded, termen bowed oblique; orange-ochreous rather densely suffused

with dark-fuscous, which forms an ill-defined basal patch, dentate postmedian line, and terminal line, cilia dark-fuscous, apices ochreous interrupted with fuscous. Hind wings with termen rounded; orange-ochreous with scanty dark-fuscous irroration towards termen, cilia concolorous.

♀. Head, thorax, palpi, antennæ, legs, and abdominal tuft whitish; wings represented by narrow linear-lanceolate whitish rudiments, sufficiently long to reach middle of abdomen.

Victoria: Williamstown, near Melbourne; Ocean Grange, near Sale.

CIRPHIS DASYNEMA, SP. NOV.

δασυκνήμις, with hairy shins.

♂ ♀, 36–40 mm. Head, thorax, and palpi grey-whitish, with scanty blackish irroration, external surface of palpi in ♂ purplish tinged. Antennæ grey, towards base grey-whitish; ciliations in ♂ $\frac{1}{2}$, bristles 1. Abdomen grey-whitish. Legs whitish, with sparse blackish irroration; anterior femora in ♂ densely hairy and anterior tibiae with immense fuscous-purple tufts. Fore wings elongate-triangular, costa nearly straight; apex rounded, termen scarcely oblique, rounded beneath; grey-whitish with sparse blackish irroration, and sometimes some patchy purple-grey suffusion; a white postmedian discal dot immediately preceded by a blackish dot; a row of dark-fuscous dots at $\frac{2}{3}$ parallel to termen; a series of minute terminal dots; cilia grey-whitish, tinged with purplish, with a fuscous subapical line. Hind wings with termen wavy; whitish, towards termen suffused with fuscous; cilia whitish, purplish-tinged except towards tornus, with a fuscous median line.

Very similar to *Cirphis ciliata*, Wlk., from which it may be readily distinguished (1) by the ♂ fore legs, (2) by the postmedian line on fore wings being single, not double.

Type in coll., Turner.

Queensland: Brisbane, in February and May. Three specimens.

MONOPIS NIVIBRACTELLA, Wlk.

♂ ♀, 15–22 mm. Head snow-white. Palpi dark-fuscous, apex of terminal joint white. Antennæ dark-fuscous; in ♂ simple. Thorax fuscous with a large white anterior spot. Abdomen ochreous. Legs fuscous; posterior pair ochreous. Fore wings elongate, slightly dilated posteriorly, costa strongly arched, apex rounded, termen obliquely rounded; dark-fuscous, markings snow-white; a large quadrilateral spot on dorsum near base, rather broadly separate from base and costa; an irregularly triangular spot on costa beyond middle; smaller spots with very irregular outlines on costa before apex, mid-termen, and tornus, the first two tending to confluence; all tending to be broken up by dark-fuscous

or ochreous-fuscous irroration; cilia dark-fuscous, on mid-termen and tornus white. Hind wings lanceolate; grey; cilia pale-ochreous, at apex grey.

This species is very similar to *Monopis meliorella*, Wlk., with which it has been confused. For some years I have recognised its distinctness, and am glad to take this opportunity of describing it. The best point of distinction is the broad dark-fuscous band between dorsal white spot and base and costâ. Both species are common and widely distributed.

North Queensland: Stannary Hills. Queensland: Brisbane, Toowoomba, Warwick, Bunya Mountains. New South Wales: Glen Innes, Kiama, Jenolan. Victoria: Melbourne.

M. meliorella I have from North Queensland: Cardwell, Mareeba, Kuranda, Stannary Hills, Townsville. Queensland: Brisbane, Rosewood, Stradbroke Island, Dalby, Warwick, Adavale.

EULECRIA IMPROBELLA, Wlk.

♂, 18 mm. Head ochreous-fuscous. Palpi fuscous, inner aspect of second joint mostly ochreous-whitish. Antennæ and thorax fuscous. Abdomen ochreous-fuscous, tuft whitish-ochreous. Legs fuscous; posterior pair whitish-ochreous. Fore wings elongate, not dilated, costa gently arched, apex rounded, termen obliquely rounded; whitish-ochreous densely irrorated with dark-fuscous; a round dark-fuscous discal dot at $\frac{1}{3}$, a second beneath it on fold, and a third in disc at $\frac{2}{3}$; veins towards termen outlined with fuscous; cilia whitish-ochreous, basal half irrorated with fuscous. Hind wings ovate-lanceolate; grey-whitish, slightly darker towards termen; cilia grey-whitish.

Victoria: Melbourne (National Museum collection).

CATALOGUE OF THE VICTORIAN CICADIDÆ IN THE NATIONAL MUSEUM, MELBOURNE.

By Howard Ashton.

(Plate IV., Figs. b, d—h, j, k.)

During my investigations into this group I have been afforded frequent opportunities for examining the collection contained in the National Museum, Melbourne, and, acting on the suggestion of the Curator, I have drawn up the following catalogue embracing all the Victorian species in the Museum. In the collection are a number of specimens determined by Walker; also a number determined by Goding and Froggatt, together with some of their types. Where there is any doubt of a species, I have followed the determinations of Distant, since he has all the material at his disposal, and has recently systematized the family in a thorough and admirable manner. Several of the species in my own collection have been determined by him, and, having these, I have found occasion to differ a little from other workers in the family. I have to thank the Curator of the Zoological Department, Mr. J. A. Kershaw, for facilities afforded me during the examination of the collections, and for the loan of several specimens. In addition to the references given here, may be understood in each case those of Distant's Catalogue of 1906.

Family Cicadidæ.

SUB-FAMILY CICADINÆ.

Division Cyclochilaria.

GENUS CYCLOCHILA, Amy. and Serv.

Type *C. australasiæ*, Donovan.

C. AUSTRALASIÆ, DONOV.

Tettigonia australasiæ, Don. *Ins. N. Holl. Hem.*, pl. II., f. 1, 1905.

Cicada olivacea, Germ., Thon. *Ent. Arch.* II., 1830; *id. Silb. Rev. Ent.* II., p. 57, 1834.

Cyclochila australasiæ, Amy. and Serv. *Hist. Hem.*, p. 470, 1843; McCoy, *Prodr. Zool. Vict. decad. V.*, p. 57, f. 4. pl. 1, 1880; *et al.*

Var. spreata, God. and Frogg., *Proc. Linn. Soc. N.S.W.*, p. 570, 1904.

GENUS PSALTODA, Stål.

Type *Psaltoda moerens*, Germ.

P. MOERENS, Germ.

Cicada moerens, Germ., *Silb. Rev. Ent.* II., p. 67, 1834.

Psaltoda moerens, Stål., *Ann. Soc. Ent. Fr.*, I., p. 614, 1861; God. and Frogg., *Proc. Linn. Soc. N.S.W.*, p. 590, 1904; *et al.*

Cicada moerens, McCoy, *Prodr. Zool. Vict.*, V., p. 53, pl. I., fs. 1, 2, 1880.

P. AURORA, Dist.

Psaltoda aurora, Dist., *Trans. Ent. Soc. Lond.*, p. 664, 1881 ;
God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 586.

(Note.—Though included in the Victorian collection, the locality must be considered as doubtful. Both Distant and Goding and Froggatt give its habitat as Queensland.)

GENUS HENICOPSALTRIA, Stål.

Type *H. eydouxii*, Guer.

H. NUBIVENA, Walk.

Fidicina nubivena, Walk., *List. Hom. Sup.*, p. 17, 1858.

Henicopsaltria rubivena, Stål., *Berl. Ent. Zeit. X.*, p. 171, 1866 ;
God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 578.

(Note.—Hitherto not recorded from within Victoria.)

SUB-FAMILY TIBICININÆ.

Division *Taphuraria*.

GENUS ABRICTA, Stål.

Type *A. brunnea*, Fabr.

A. AURATA, Walk.

Cicada aurata, Walk., *List. Hom. I.*, p. 215, 1880 ; *et al.*

Tibicen auratus, *God. and Frogg.*, *Proc. Linn. Soc. N.S.W.*, p. 606,
1904.

(Note.—One specimen determined by Walker in the collection.)

GENUS DIEMENIANA, Dist.

Type *D. colcoptrata*, Walk.

D. COLEOPTRATA, Walk.

Cicada coleoptrata, Walk., *List. Hom. I.*, p. 223, 1850.

Tibicen coleoptrata, Stål., *Otv. Vet. Ak. Förh.*, p. 485, 1862.

Tibicen coleoptratus, *God. and Frogg.*, *Proc. Linn. Soc. N.S.W.*,
1904, p. 608.

Diemenia coleoptrata, Dist., *Ann. Mag. Nat. Hist. (7)*, XVI.,
p. 206, 1905 (*Gen. nom. praeocc.*).

Diemeniana coleoptrata, Dist., *Syn. Cat. Hom. I., Cicad.*, p. 145,
1906.

(Note.—One specimen determined by Walker in the collection.)

Division *Melampsaltraria*.

GENUS MELAMPSALTA, Am.

Type *M. musiva*, Germ.

M. DENISONI, Dist.

Melampsalta denisoni, Dist., *Ann. Soc. Ent. Belg.*, XXXVII.,
p. 78, 1893 ; *God. and Frogg.*, *Proc. Linn. Soc. N.S.W.*, p. 636, 1904.

Melampsalta kershawi, God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 636.

(Note.—The type specimen of *M. kershawi* is a female of *M. denisoni*, faded in colour, and rather mutilated.)

M. BINOTATA, GOD. AND FROGG., *Proc. Linn. Soc. N.S.W.*, 1904, p. 643.

Melampsalta angusta, God. and Frogg. (*nec. Walk.*), *loc. cit.*, p. 643.

(Note.—Determined by Walker as *M. angusta*, Walk., in the collection. In the Macleay Museum, Sydney, Goding and Froggatt have determined the male as *M. angusta*, and the female as *M. binotata*, God. and Frogg. *M. angusta* is a synonym for *M. cruentata*, Fabr., a very distinct species, from New Zealand.)

M. CRUENTATA, Fabr.

Tettigonia cruentata, Fabr., *Syst. Ent.*, p. 680, 1775.

Melampsalta cruentata, Stal., *Hem. Fabr.*, II., p. 116, 1869.

Cicada sericea, Walk., *List. Hom.*, p. 169, 1850.

Cicada rosea, Walk., *loc. cit.*, p. 220.

Cicaula angusta, Walk., *loc. cit.*, p. 174.

Cicada bilinea, Walk., *List. Hom. Supp.*, p. 34, 1858.

Cicada muta, Kirby, *Trans. N.Z. Inst.*, XXVIII., p. 445, 1885.

Melampsalta angusta, Dist., *Ann. Mag. Nat. Hist.* (6), IX., p. 326, 1892; God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 643.

(Note.—One specimen amongst Victorian Cicadidæ, but without locality. In all probability from New Zealand.)

M. ABDOMINALIS, Dist.

Melampsalta abdominalis, Dist., *Ann. Mag. Nat. Hist.* (6), IX., p. 323, 1892; God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 634.

(Note.—One female specimen determined by Walker as *Cicada melanopygia*.)

M. MURRAYENSIS, Dist.

Melampsalta murrayensis, Dist., *Ann. Mag. Nat. Hist.* XX., p. 421, 1907.

Melampsalta abbreviata, God. and Frogg. (*nec. Walk.*), *Proc. Linn. Soc. N.S.W.*, p. 649, 1904.

(Note.—Determined by Goding and Froggatt in the Macleay Museum and National Museum, Melbourne, as *M. abbreviata*, Walk. This latter species has been placed, however, in the genus *Quintilia*, and determined by Distant as *Q. infans*, Walk. This genus may be distinguished by having the upper ulnar veins distinctly separate at base.)

M. LANDSBOROUGH, Dist.

Melampsalta landsboroughi, Dist., Proc. Zool. Soc. Lond., 1882, p. 131, pl. VII., fs. 14a, b; God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 639.

Melampsalta tristrigata, God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 638.

(Note.—Determined by God. and Frogg. in the Macleay Museum and also in the National Museum, Melbourne, as *M. tristrigata*, God. and Frogg. Also determined in the female form in the latter collection by God. and Frogg., as *M. incepta*, Walk. The species is very variable, both in colour and size, especially in the female form.)

M. TORRIDA, Erich.

Cicada torrida, Erich., Arch. I., p. 286, 1842.

Cicada basiflamma, Walk., List. Hom., I., p. 170, 1850.

Cicada connexa, Walk., loc. cit., p. 173.

Cicada damater, Walk., loc. cit., p. 178.

Melampsalta torrida, God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 631.

(Note.—Two specimens, male and female, in the collection determined correctly by Walker; several determined as *M. interruptus*? Walker has also determined a Western Australian species as *Cicada basiflamma*, and Goding and Froggatt have correctly described this as their type of *M. rubricincta*.)

M. RUBRISTRIGATA, God. and Frogg.

Melampsalta rubristrigata, God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 638.

(Note.—These specimens were sent to me by Mr. G. Lyell, from Horsham. Recorded by Goding and Froggatt from South Australia only.)

M. OXLEYI, Dist.

Melampsalta oxleyi, Dist., Proc. Zool. Soc. Lond., p. 131, 1882 God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 655.

(Note.—This species, so far, has only been recorded from Queensland.)

M. LABYRINTHICA, Walk.

Dundubia labyrinthica, Walk., List Hom., p. 75, 1850.

Melampsalta labyrinthica, Stål., Ofv. Vet. Ak. Förh., p. 484, 1862; God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 646.

Cicada interstans, Walk., List Hom. Sup., p. 32, 1858.

Melampsalta interstans, Stål., Ofv. Vet. Ak. Förh., p. 484, 1862; God. and Frogg., Proc. Linn. Soc. N.S.W., 1904, p. 634.

(Note.—One specimen determined as *C. sericea* by Walker. The confusion has arisen through the generally lighter colour of the female. Both sexes are described by Walker under different names.)

GENUS KOBONGA, Dist.

Type *K. umbrimago*, Walk.

K. UMBRIMAGO, Walk.

Cicada umbrimago, Walk., *List Hom. Sup.*, p. 32, 1858.

Melampsalta umbrimago, Stål., *Öfv. Vet. Ak. Förh.*, p. 484, 1862;
God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 632.

Kobonga umbrimago, Dist., *Ann. Mag. Nat. Hist.* (7), XVII.,
p. 387, 1906.

(Note.—Sent by Mr. J. A. Leach from Nyah; the only recorded
specimen of the species from outside Western Australia.)

GENUS PAUOPSALTA, God. and Frogg.

Type *P. mneme*, Walk.

P. MNEME, Walk.

Cicada mneme, Walk., *List Hom. I.*, p. 181, 1850.

Cicada antica, Walk., *loc. cit.*, p. 182.

Melampsalta mneme, Stål., *Öfv. Vet. Ak. Förh.* p. 484, 1862.

Pauropsalta leurensis, God. and Frogg., *Proc. Linn. Soc. N.S.W.*,
1904, p. 622.

P. ENCAUSTICA, Germ.

Cicada encaustica, Germ., *Silb. Rcv. Ent. II.*, p. 62, 1834.

Cicada arclus, Walk., *List Hom. I.*, p. 184, 1850.

Cicada dolens, Walk., *loc. cit.*, p. 188.

Cicada juvenis, Walk., *loc. cit.*, p. 190.

Pauropsalta encaustica, God. and Frogg., *Proc. Linn. Soc. N.S.W.*,
1904, p. 662.

P. ANNULATA, God. and Frogg.

Pauropsalta annulata, God. and Frogg., *Proc. Linn. Soc. N.S.W.*,
p. 620, 1904.

Pauropsalta encaustica, Dist., *Syn. Cat. Hom. Cicad. I.*, p. 178,
1906 (*nec* God. and Frogg.).

P. DUBIA, God. and Frogg.

Pauropsalta dubia, God. and Frogg., *Proc. Linn. Soc. N.S.W.*,
1904, p. 621.

GENUS URABUNANA, Dist.

Type *U. sericeivitta*, Walk.

U. FESTIVA, Dist.

Urabunana festiva, Dist., *Ann. Mag. Nat. Hist.* (7), XX. p. 423,
1907.

(Note.—Determined by Walker as *Melampsalta puer*, Walk.
The genus is, however, distinct in the possession of four apical areas
to the wings.)

Division Tettigarctaria.

GENUS, TETTIGARCTA, White.

Type, *T. tomentosa*, White.

T. CRINITA, Dist.

Tettigarcta crinita, Dist., *Proc. Zool. Soc. Lond.*, 1883, p. 188, f. 5a, b, c., pl. XXV.; God. and Frogg., *Proc. Linn. Soc. N.S.W.*, 1904, p. 666, pl. XVIII., figs. 3, a, b.

(Note.—Specimens in the collection also determined as *T. tomentosa*, White, from which species, however, *T. crinita* may be readily distinguished by the absence of the spinous projection on the lateral borders of the pronotum.)

EXPLANATION OF PLATE IV.

I have figured eight species which have not so far been illustrated. Several of these have been the subject of some confusion, especially *Tamasa tristigma*, Erich.

Fig. *b.*—*Melampsalta torrida*, Erich. Victoria.

Fig. *d.*—*Diemeniana colcoptrata*, Walk. Victoria.

Fig. *e.*—*Urabunana festiva*, Dist. Victoria.

Fig. *f.*—*Tamasa tristigma*, Germ. Queensland.

Fig. *g.*—*Abricta aurata*, Walk. Victoria.

Fig. *h.*—*Melampsalta binotata*, God. and Frogg. Victoria.

Fig. *j.*—*Melampsalta rubricincta*, God. and Frogg. Western
Australia.

Fig. *k.*—*Henicopsaltria nubivena*, Walk. Victoria.

DESCRIPTIONS OF NEW AUSTRALIAN CICADIDÆ IN THE NATIONAL MUSEUM, MELBOURNE.

By Howard Ashton.

(Plate IV., Figs. a, c, i.)

While engaged in the preparation of the Catalogue of Victorian Cicadidæ in the National Museum, the following species were found to be new.

These, with the consent of the Director, Professor Baldwin Spencer, I am now enabled to describe and figure.

Family Cicadidæ.

SUB-FAMILY CICADINÆ.

Division Cicadaria.

GENUS MACROTRISTRIA.

MACROTRISTRIA DORSALIS, SP. NOV. (Fig. a, 1, 2.)

Male.—Body above ochraceous, mesonotum tinged with brownish, in fresh specimens probably greenish. Central sulcus to vertex of head, a short longitudinal and anteriorly angulate spot on each side of region of ocelli, and anterior margins to eyes and basal margin of front very narrowly black. Abdomen with a broad central dorsal longitudinal fascia extending from base, where it is very wide, and narrowing sharply to penultimate segment; base of apical segment and spot on anal appendage piceous or black. Face and head beneath, bright ochraceous; sternum, opercula, and legs sordid ochraceous brown; anterior and intermediate tarsi and disc of abdomen beneath warm fuscous. Tegmina and wings hyaline, talc-like; tegmina with costal membrane and area and basal half of venation ochraceous; postcostal area and apical venation fuscous, and claval nervure black; wings to basal two-thirds of venation pale ochraceous, apical veins light fuscous. Head (including eyes) equal in breadth to lateral dilations of posterior pronotal margin. Abdomen much shorter than space between apex of head and base of cruciform elevation; rostrum with tip piceous, barely reaching posterior coxæ. Lateral areas of abdomen much depressed. Long., male 25 mm., female, 23 mm.; exp. teg. 75 mm.

Habitat.—Kuranda, Queensland; several male and female specimens. (Presented by R. W. Armitage, 1908.)

Allied to *M. intersecta*, Walk., and *M. sylvanella*, God. and Frogg., but differing in the shorter abdomen and overlapping opercula. Differing also from *M. extrema*, Dist., by the narrower head and thorax. The dark fascia on the dorsum renders it easily identifiable.

SUB-FAMILY TIBICININÆ.

Division *Melampsaltraria*.

GENUS MELAMPSALTA.

MELAMPSALTA CYLINDRICA, SP. NOV. (Fig. i.).

Male.—Body above black, anterior and lateral discal areas of pronotum suffused with castaneous, a central short longitudinal fascia to same; spots on mesonotal cruciform elevation, posterior margins of third, fourth, fifth, sixth, and seventh abdominal segments and tip of anal appendage ochraceous. Head beneath, sternum and legs piceous, margins of front, a large spot on each side of prosternum, rostrum (excluding apex) apices of coxæ, trochanters beneath, stripes to anterior femora, stripe beneath and apices of intermediate and posterior femora, bases of intermediate and posterior tarsi, opercula, and posterior margins of third, fourth, fifth, and sixth abdominal segments, ochraceous. Tegmina talc-like, costa and venation brownish-testaceous at base, piceous towards apex; first and second apical anastomoses broadly and darkly suffused with fuscous. Wings similar, with anal streak milky. Head narrower than pronotum, which is equal in width to the mesonotum and abdomen; abdomen longer than space between apex of front and base of cruciform elevation. Breadth of tegmina considerably more than one-third the length. Rostrum reaching intermediate coxæ; opercula large, obliquely reniform, shining piceous at base. Long., male, 25 mm.; exp. teg., 68 mm.

Habitat.—Victoria (Fernshaw).

One male in the collection labelled *M. labeculata*, Dist., by Goding and Froggatt. The species resembles superficially one of the smaller species of *Tibicina*, being similar in general form to *T. septemdecim*, Linn., the well-known U.S.A. species.

MELAMPSALTA CAPISTRATA, SP. NOV. (Fig. c.).

Male.—Body above and below yellow. Head with broad black fascia (embracing area of ocelli) between eyes. Pronotum with central longitudinal fascia and narrow borders to lateral margins black. Mesonotum black, metanotum and abdomen yellow. Tegmina and wings hyaline, immaculate, venation piceous, costa yellow. Body below with sides of face and apex of rostrum (which extends to intermediate coxæ), black.

Female.—With the mesonotum also yellow, and four obconical anterior marginal spots (central pair shortest), fine central fascia behind these, and spots before the anterior angle of cruciform elevation black. Abdominal segments finely margined with black.

Long., male, 11 mm.; female, 14 mm.; exp. teg., male, 31 mm.; female, 38 mm.

Habitat.—Queensland (Kuranda). Presented by R. W. Armitage.

Allied to *M. froggatti*, Dist. I have examined two male and one female specimens; one of the males has five apical areas only in one wing.

EXPLANATION OF PLATE IV.

Fig. *a*, 1, 2.—*Macrotristria dorsalis*, sp. nov. Queensland.

Fig. *c*.—*Melampsalta capistrata*, sp. nov. Queensland.

Fig. *i*.—*Melampsalta cylindrica*, sp. nov. Victoria.

ON A NEW RHYTIPHORA IN THE NATIONAL MUSEUM, MELBOURNE.

By Arthur M. Lea, F.E.S.

Some time ago, Mr. C. French sent for examination a very large *Rhytiphora*, with the request that I should describe it if new. This it appeared to be, and I would gladly have described it then, but thinking it possible that such a fine insect would not have escaped description if in other entomologists' hands, and that the Zoological Records are usually about two years behind in their records, I deferred describing it till after hearing from Mr. C. J. Gahan, of the British Museum, to whom I wrote. In the interim I returned the specimen to Mr. French, and he gave it to the National Museum, from whence, at my request, I have again received it.

The species is certainly allied to *R. dallasi*, but is even more magnificent than that fine species, from which it differs in being considerably larger, the clothing denser, somewhat differently disposed, and not uniformly silvery. The most noticeable difference is in the elytral costæ; counting the suture as the first, then the third and fourth on each elytron are conjoined close to apex, with the space between densely clothed with ochreous instead of silvery pubescence, and the space equal to or even more than the space between the second and third. In *dallasi*, the third and fourth are not conjoined at apex, and the space between them is much less than that between the second and third. On the prothorax, the dark transverse lines are two in number instead of four, as in *dallasi*.

Mr. Gahan wrote—"I have not described nor do I know any species of *Rhytiphora* answering to the description you have sent me. It appears certainly to be distinct from *dallasi*. In all our four specimens of *dallasi*, the white elytral band between the third and fourth costæ is very narrow, barely more than a line, and in one specimen it is partly broken up into spots. I notice that in the male of *dallasi* there is no pubescent depression at each side behind the posterior margin of the first abdominal segment, as there is in most of the other species of *Rhytiphora*. But this sexual character varies a good deal, being more pronounced in some species, and very feeble in others. Have you noticed the sex of the specimen of the new species?"

I was under the impression that the type is a female, as although the abdomen is conspicuously variegated, the pubescent depressions common to so many males of the sub-family are entirely absent; and in *Rhytiphora* I know of no other external feature by which the

sex of an unique specimen may be determined. Still, if *dallasi* is without such depressions in the male, quite possibly the male of this species is without them.

At Mr. French's request, the species is named after the late Sir William Macleay.



RHYTIPHORA MACLEAYI, SP. NOV.

Black. Densely clothed with white and ochreous pubescence, in places glabrous or with black pubescence; the elytra conspicuously striped.

Head large, with rather coarse but partly concealed punctures, with a narrow continuous median line. *Antennæ* of moderate length. *Prothorax* about one-fourth wider than long, transversely rugose. *Elytra* widest across shoulders, sides thence regularly diminishing in width to apex, where each is acutely spined; with four almost equidistant feeble but conspicuous elevations on each, the first very close to suture, the second terminated at about the apical fifth, the third commencing just within the shoulder, and the fourth just below it, these two conjoined near apex; all these ridges have small granules towards the base, sometimes rounded, but often acute, and all have coarse punctures gradually decreasing in size posteriorly, but smaller on the subsutural ridge than the others; the margin is narrowly ridged and smooth. Length 43, width 15 mm.

Habitat.—Western Australia: Kookynie.

The clothing on the head is ochreous, but becomes whitish below the eyes and about the mouth; on each side of the base near the middle there is a narrow black patch, straight on its inner, and curved on its outer edge. On the prothorax, the pubescence is whitish, but in places more or less deeply stained with ochreous, and leaving two curved black transverse lines, a median one not interrupted in middle, and a sub-basal one interrupted in middle. The scutellum has ochreous clothing, margined with black. On each elytron the stripes are as follow:—An extremely narrow pale

sutural stripe, a narrow black stripe, a wide silvery stripe, a narrow black stripe, terminated at the apical fifth, a wide silvery stripe, a narrow black stripe conjoined near tip with another on the outer edge of a wide ochreous stripe, a wide silvery stripe, and then the narrow black margin; the white stripes about the base are more or less stained with ochreous. Under surface with silvery pubescence marked with ochreous stripes (one at apex of each abdominal segment) and blotches, and black patches (a longitudinal one towards each side of metasternum, and a curved one—very narrow across middle—on each abdominal segment). Antennal joints white tipped with black, but the black increasing till at the seventh it covers half the surface, and the eleventh is white at the extreme base only. The black patches and stripes are due either to the surface being bare or to being clothed with very short black pubescence.

ON AN UNNAMED SPECIES OF PECTEN FROM THE TERTIARY (BARWONIAN) OF SOUTHERN AUSTRALIA.

By Frederick Chapman, A.L.S., F.R.M.S., Palaeontologist to the
National Museum, Melbourne.

(Plate V.)

A form of *Pecten*, somewhat closely related to Tate's *Pecten consobrinus* has long been known to Australian palaeontologists as *P. consobrinus* var. In Professor Tate's "A Revision of the Older Tertiary Mollusca of Australia,"* that author refers to *P. consobrinus*, var., as occurring at Aldinga Bay (Lower beds), Shelford, Maude and Belmont, Waurn Ponds, and Spring Creek. Messrs. Dennant and Kitson, in their "Catalogue of the Described Species of Fossils (except Bryozoa and Foraminifera) in the Cainozoic Fauna of Victoria, South Australia, and Tasmania,"† cite the following localities for *Pecten consobrinus* var. Tate:—Aldinga (Lower beds), Aire Coast, Fishing Point and Guerard Hill, Shelford, Lower Moorabool, Maude, ? Corio Bay, Curlewis-Belmont, ? Mitchell River, Waurn Ponds, and Spring Creek.

It will thus be seen that this particular form is practically restricted to Janjukian beds, and possibly to the horizon immediately below, or the summit of the Balcombian series.

The species *P. consobrinus* was originally described from the Upper beds at Aldinga; whilst the variety occurs in the lower part of the same series, which is shown by its faunal characters, allowing for local lithological differences, to belong to our Victorian Janjukian beds.

The present note is written to establish a name for this variety of *P. consobrinus*, for the convenience of future reference. Since it would appear illogical to refer to an ancestral form of an already described species as a variety thereof, it seems advisable to give it a specific standing, at the same time bearing in mind the fairly close relationship existing between it and the species from the younger beds. Its claims to a specific name are perhaps as great as are those of *P. antiaustralis* and *P. australis*. The affinity with *P. consobrina* is denoted by the denomination *praecursor*.

DESCRIPTION OF TYPE OF PECTEN PRAECURSOR, SP. NOV.
(= "*P. consobrinus* var." TATE).

The type selected is a left valve of medium size (between the neanic and ephebic stages).

Locality—Spring Creek, Torquay (*ex* Dennant Coll.)

* Trans. R. Soc. South Australia, vol. xxiii, 1899, p. 269.

† Rec. Geol. Surv., Victoria, vol. i., pt. 2, 1903, p. 119.

Description.—Valve triangularly orbicular, nearly equilateral, the antero-ventral border more sharply curved than the posterior; surface with ten major folds, subacute, with a summit ridge and generally two lateral ridges on either side; interspaces occupied by from 2-6 costulae, the central usually stronger. All the riblets are closely lamellose or tegulate. Ground surface finely granulate, with shagreen texture, tending to develop into transverse undulate ornament at the extremities of the valves. Ears very unequal; anterior triangular, with outer margin truncated, having five radial costae; interspaces granular; posterior triangular, truncated; faintly costate and granular.

Measurements of type—Height, 25 mm.; length, 24 mm.

Remarks.—This form differs from *P. consobrinus* in having normally ten folds instead of eight. The folds are subacute, whereas in *P. consobrinus* they are gently convex and equally and numerous costate. In *P. praecursor*, moreover, the transverse ornament of the riblets is, in fresh specimens, more decidedly tegulate, whereas in *P. consobrinus* the ornament is a series of delicate concentric frills.

This species appears to pass upward into *P. consobrinus* (Kalimnan) by loss of major folds, and to pass downward into *P. foulcheri* (Janjukian) and Balcombian by increase of folds and transition of tegulate ornament into the erect squamose.

EXPLANATION OF PLATE V.

- Fig. 1.—*Pecten praecursor*, sp. nov. Holotype. Spring Creek, Torquay. (Dennant Coll.) Janjukian.
- Fig. 2.—*P. praecursor*, sp. nov. Paratype. Wauru Ponds, near Geelong. (Coll. Geol. Surv., Victoria.) Janjukian.
- Fig. 3.—*P. praecursor*, sp. nov. Paratype. Curlewis. (Coll. Geol. Surv., Victoria. Ad. 12.) Barwonian.

The figures are enlarged 7·25ths more than actual size

NOTES ON A COLLECTION OF TERTIARY LIMESTONES AND THEIR FOSSIL CONTENTS, FROM KING ISLAND.

By Frederick Chapman, A.L.S., F.R.M.S., Palæontologist to the
National Museum, Melbourne.

(Plates VI., VII.)

INTRODUCTORY REMARKS.

The samples of limestone and limestone-fossils herein described were collected by Mr. J. A. Kershaw, F.E.S., whilst on a recent exploring trip to King Island. Mr. Kershaw informs me that he found this limestone cropping out on the extreme south-east part of the island, and well exposed in the river bed and banks of the Seal River. The outcrop showed a vertical thickness of about 25 feet. The limestone in places was very hard, and the horizontal bedding could be clearly seen on account of the weathering of the softer layers; the more compact limestones projecting as ledges. The polyzoal rock with pectens was found outcropping at the surface of the upper levels. In the absence of any further note as to the relation of the hard limestone to the polyzoal rock, it may be inferred that the latter overlies the hard limestone; and, if this be the case, we have a similar sequence to that of the polyzoal rock of the Grange Burn, which is underlain by the hard pink limestone cropping out at the junction of Grange Burn and Muddy Creek.

The present collection does not comprise many determinable fossils, but, nevertheless, is of great interest, for although several outcrops of tertiary limestone have already been reported from King Island,* no fossils seem to have been collected.†

Prof. Baldwin Spencer, in his report on the general results of the expedition to that locality in 1887,‡ states that the limestone "lies directly upon the granite, and is widely distributed. Thus it was cut through (though the depth of the bed was not recorded) in laying the foundation for the Wickham lighthouse before the grey granite was reached. Again, an outcrop occurs half way from here to Yellow Rock, and on the east coast one a little south of Lavinia Point, and another at the Blow-hole Creek. On the west it is well marked on the coast between the Pass and Ettrick Rivers, inland near Porky Lagoon, and again forms an extensive formation

* See "Expedition to King Island, November, 1887."—*Vict. Nat.*, vol. iv., Jan., 1888.

† Since writing the above and following account of the fossils (May, 1909), I have seen a paper by Mr. F. Debenham, B.A., entitled "Notes on the Geology of King Island, Bass Straits."—*Proc. R. Soc. N. S. Wales*, vol. xliv., 1910, pp. 560-576. That author describes therein this same Tertiary limestone of the Seal River, and records *Pecten* aff. *antiaustralis*, *Lima* cf. *bassi*, T. Woods; *Hipponyx* cf. *australis*; *Turritella* sp., (?) *Hemithyris*, and *Retepora*. These determinations were made by Mr. W. S. Dun, F.G.S., who regards this limestone (and rightly so from the present examination) as belonging to the Table Cape Series.

‡ *Loc. supra cit.*, p. 163.

on the surface inland from Fitzmaurice Bay." Mr. Kershaw's discovery of the same limestone series at the Seal River is therefore additional to the previous records.

During a recent expedition Mr. E. B. Nicholls obtained specimens of a limestone of similar age to the above, and largely composed of polyzoa, which he collected on the east coast, 8 or 9 miles south of Sea Elephant River. This also is a new locality. The specimens have been presented by Mr. Nicholls to the Museum.

GENERAL DESCRIPTION.

One variety of the limestone from the Seal River is of a pale ochreous colour, fragmental in structure and of a friable nature. Hand specimens of this rock are seen to consist chiefly of polyzoa with occasional shells of pectens and other mollusca. It bears a strong resemblance to certain beds of polyzoal rock at Waurn Ponds, Batesford, and Torquay.

A harder limestone, associated with the polyzoal rock, is yellow to pink in colour, close textured, and occasionally cavernous, with a tendency to the development of crystalline calcite in the hollows. This rock, like the former, contains much polyzoa and numerous echinoid spines. In its hard texture and pink colour it is closely comparable with the compact limestone of the beds occurring in association with the older basalt on the banks of the Moorabool River, near Maude (W.T.M. 2 and 4 in Nat. Mus. Coll.).

A microscopical examination of thin sections of the friable limestone (Pl. VII., fig. 5) shows the same organic constituents as the compact rock, with the exception that the former has a liberal proportion of clear calcitic cement between the individual grains, whilst the hard limestone has a cement of the nature of a dense pinkish-brown calcareous mud (Pl. VII., fig. 6).

DESCRIPTION OF THE FOSSILS.

THALLOPHYTES.

Boring (?) Fungi.

PALAEACHLYA TUBEROSA, SP. NOV.

(Plate VII., Fig. 4.)

Some of the shell fragments in the pink limestone were seen to be perforated by a parasitic boring organism. Remains of this kind are frequently met with in both recent and fossil shells and corals, as well as in fish-scales, teeth, and bones. Certain of these are referred to algæ, whilst others are regarded as fungi.† It is probable that the form herein dealt with is of the nature of a fungus, since the thallus is merely constricted and not distinctly septate, and has sporangium-like terminations.

* 30th November, 1908.

† See Seward. Fossil Plants, vol. i., 1898, p. 127.

Description of the borings of P. tuberosa.—Found in shell fragments which are generally more or less water-worn. Perforations (A type), at first slender, entering the shell at right angles to the shell surface or nearly so,* subsequently becoming slightly tortuous, and tending to give off short branches, gradually increasing in width until terminated by a blunt or swollen end; colour, amber yellow. Other perforations in association (B type), commencing as an extremely fine short tube, which suddenly develops a more or less globular termination (? sporangium). Colour, deep reddish brown. Tubes and terminal swellings usually more or less filled with granular material, probably of the nature of spores, some of which are also seen scattered in the neighbourhood of the (?) sporangium. As mentioned above, no distinct septation of the vegetative structure visible, but occasional constrictions occur through the course of the tube. The borings average 13 micra in diameter, and 86 micra in length; sub-globose terminations averaging 18 micra in diameter.

Observations.—The shortness of the perforations and their characteristic clavate terminals serve to distinguish the present form from Duncan's *Palaeachlya perforans*,† which that author found very widely distributed in geological time; one example described having occurred in a foraminifer of Ordovician age.‡

MM. Bornet and Flahault§ have described a boring organism, *Lithopythium*, which they refer to the fungi. Their species, *L. queketti*, bears certain resemblances to the above form; it has a tortuous and filamentous thallus, with globular sporangia at the terminations and outer angles of the sinuses. It differs, however, in the closely interlacing habit of the thallus and the perfectly globular sporangia.

With regard to Australian occurrences of *Palaeachlya*, Mr. R. Etheridge, jun., has described *P. tortuosa* as a parasitic species within a Queensland monticuliporid of Carbo-permian age.|| The chief characters of that species are, a flexuous tube, circular in section, with the terminations irregularly enlarged and with occasional swellings along the course of the tube. Another species instituted by Etheridge is *P. torquis*,¶ found in the coenosteum of a species of *Favosites* from the Devonian limestone of Tamworth, New South Wales. This form consists of slender contorted tubes, filled with yellow granular matter, and having a diameter of .01 mm. It will be seen that the tube of this species is comparable in size to

* In the case of a prismatic shell, the boring seems to be facilitated by the organism penetrating along the principal axial line or prismatic direction, for easy solution of its base of attack may constitute an important factor in its growth.

† Quart. Journ. Geol. Soc., vol. xxxii., 1876, p. 205, pl. xvi.

‡ Loc. cit., pl. xvi., fig. 5.

§ "Sur les Algues Perforantes," Bull. Soc. Bot., France, vol. xxxvi., 1889, p. clxxii., pl. xii., figs. 5, 6.

|| Rec. Geol. Surv. N.S.W., vol. ii., pt. 3, 1891, p. 95, pl. vii., fig. 1.

¶ Rec. Aust. Mus., vol. iii., No. 5, 1899, p. 121, pl. xxiii., fig. 5.

the above-described form, but which differs, in the very limited length of the tubes, their swollen ends, and occasional bifurcation. It is worthy of notice that Professor Duncan, in his paper previously referred to, figures some very diverse forms under his diagnosis of *Palaeachlya perforans*, and that one of his examples, from a Tasmanian Tertiary coral (*Thamnastraea*) is distinct from our species in that the tubes are excessively slender, long, and tortuous.* *P. tuberosa* also occurs in shell fragments in the limestone of the Moorabool Valley at Maude.

In the pink limestone; Seal River.

Marine Algæ—RHODOPHYCEÆ.

LITHOTHAMNIUM SP.

Minute fragments of this calcareous alga were seen in thin sections of both limestones, but were too imperfect to compare with any Tertiary examples already described. They belong to a ramose form, since a terminal fragment was observed, showing the characteristic curved and divergent series of cells. The cells from a well-developed branchlet showed a height of .034 mm. and a width of .019 mm.

FORAMINIFERA.

GLOBIGERINA cf. BULLOIDES, d'Orbigny.

(Plate VI., Fig. 1.)

G. bulloides, d'Orbigny, 1826, Ann. Sci. Nat., vol. VII., p. 277, No. 1.—Modèles, Nos. 17 and 76.

G. bulloides, d'Orb., Brady, 1884, Rep. Chall., vol. IX., p. 593, pl. lxxvii., lxxix., figs. 3-7.

A nearly median section of a *Globigerina* shell occurs in a thin slice of the hard pink limestone. Its test is moderately thick, and from the regular helicoid form, it appears to be referable to *G. bulloides*. This species has been recorded by Mr. Howchin from the Muddy Creek (lower) beds (Balcombian), Waurn Ponds (Janjukian), and Mount Gambier (Barwonian).

TRUNCATULINA LOBATULA, Walker and Jacob, sp.

Nautilus lobatulus, Walker and Jacob, 1798, Adams' Essays, Kanmacher's Ed., p. 642, pl. xiv., fig. 36.

Truncatulina lobatula, W. and J. sp., d'Orbigny, 1839, Foram. Canaries, p. 134, pl. ii., figs. 22-24.

One example, with unusually well-inflated chambers, was found in washings from the polyzoal limestone.

This species has been recorded by Mr. Howchin from the older beds of Muddy Creek, the Government Well at Murray Flats, the Government Bore at Kent Town, Adelaide, and from the west end of Torrens Lake, Adelaide, the last in comparatively younger strata.

* Q. J. G. S., vol. xxxii., 1876, pl. xvi., fig. 1.

TRUNCATULINA VARIABILIS, d'Orbigny.

(Plate VII., Fig. 6a.)

T. variabilis, d'Orbigny, 1826, Ann. Sci. Nat., Vol. VII., p. 279, No. 8; Brady, 1884, Rep. Chall., Vol. IX., p. 661, pl. xciii., figs. 6, 7.

A good example of *T. variabilis* is seen in a thin section of the pink limestone from the Seal River. It is easily recognised by its thin test and numerous chambers arranged in a tortuous and broken-spiral fashion.

From the Australian Tertiaries, Mr. Howchin obtained this species in the older beds of Muddy Creek.

TRUNCATULINA UNGERIANA, d'Orbigny sp.

(Plate VI., Figs. 2a-c.)

Rotalina ungeriana, d'Orbigny, 1846, Foram. Foss. Vien., p. 157, pl. viii., figs. 16-18.

Truncatulina ungeriana, d'Orbigny sp., Brady, 1884, Rep. Chall., Vol. IX., p. 664, pl. xciv., figs. 9a-c.

A small example with a very deep and conical inferior face was found in the washings of the polyzoal rock.

Mr. Howchin recorded this form as occurring in the Lower and Upper Muddy Creek beds, at Mount Gambier, the Bore on the Murray Flats, and the Kent Town Bore, Adelaide.

ANTHOZOA.

ALCYONARIA.

MOPSEA HAMILTONI, Thomson sp.

(Plate VI., Figs. 3 a, b; 4.)

Isis hamiltoni, Thomson, 1908, Trans. and Proc. N.Z. Inst., Vol. XI., p. 99, pl. xiv., fig. 1.

In the present series there are two calcareous joints of an alcyonarian which may be referred to the above species. One of them is more or less cylindrical (subquadrate), and longitudinally grooved with comparatively coarse and deep furrows. Ridges often once bifurcated and slightly twisted. A few impressed puncta visible along the surface of the ridges and sometimes in the furrows. A scar on the side of this specimen seems to indicate the position of a branchlet. End of axis dilated and meeting the internodal surface to form a tolerably sharp angle. Terminal face subconical, furrowed, and subdivided into a series of primary septa, and by further division into as many again. These furrows are generally continuous with those on the lateral surface. There is a small conical papilla in the centre of the articular surface. Diameter of axis, 2.5 mm.

The second specimen is much shorter, slightly stouter, and with the lateral furrows crossed by little bars or dissepiments, giving the grooves a distinctly punctate appearance.

There is no doubt of the relationship of the two specimens figured, since all the chief characters are common to both.

Observations.—*Mopsea hamiltoni* has been lately described by Mr. J. A. Thomson, from the greensands accompanying the limestones at Kakanui, New Zealand. Mr. Thomson remarks on the apparent identity of Duncan's New Zealand example, *Isis* sp.*, with the type above referred to, and the writer had come to the same conclusion regarding these, and also the Cape Otway specimens figured by Duncan,† prior to seeing Mr. Hamilton's paper. The fossils, however, belong to the genus *Mopsea* and not to *Isis*, as will be seen on comparing the structure of the joints with those of the species of *Mopsea* still found living round the Australian coast. Duncan's remarks upon the affinities of the fossils did not clear the ground for later students, for, in following Ehrenberg, he says, "It is this branching from the calcareous body which distinguishes the genus *Isis* from *Mopsea*, in which the branching starts from the horny substance (*loc. cit.*, p. 673). In point of fact, the typical *Mopsea encrinura*, to which our species is allied, shows the branching to take place on the calcareous internodes by the formation of a horny node, in some cases, however, so close to the node as to appear to start from it, when in reality it is attached to the calcareous joint (see also Wright and Studer, *Chall. Rep. on Alcyonaria*, p. 40).

The above species is distinct from Tenison Woods' *Isis dactyla*,‡ in having finer lateral striations and concentrically lineate condyles. *Isis melitensis* of Goldfuss,§ is more nearly related to *I. dactyla* in having fine and numerous lateral furrows; whilst the internodal faces are acutely conoidal and devoid of radial grooves. Goldfuss' species was found in the Pliocene of Sicily and Piedmont.

The above species was found in the polyzoal rock of the Seal River outcrop.

ECHINODERMATA.

CIDARIS (*Leiocidaris*) cf. AUSTRALIAE, Duncan sp.

Leiocidaris australiae, Duncan, 1877, *Quart. Journ. Geol. Soc.*, Vol. XXXIII., p. 45, pl. iii., figs. 1, 2.

There is a somewhat worn fragment of the test of a cidarid in the present series. It shows a portion of the interambulacral area with two primary tubercles and a line of ambulacral pores. Only the one species above mentioned has been recorded from our Tertiaries, and the present specimen, so far as the fragment shows, is probably referable to it. It was first described from the Cape

* *Quart. Journ. Geol. Soc.*, vol. xxxi., 1875, p. 675, pl. xxxviii., figs. 1, 1a.

† *Loc. supra cit.*, p. 674, pl. xxxviii., figs. 5, 5a.

‡ *Palæont. New Zealand*, pt. iv., "Corals and Bryozoa of the Neozoic Period in New Zealand," 1880, p. 7, pl. i., fig. 1.

§ *Petrefacta Germaniae*, 1826-1833, vol. i., p. 20, pl. vii., fig. 17.

Otway beds (Janjukian). It also occurs in the Lower Aldingan beds, and the higher zones of the Balcombian, as at Bairnsdale, and has also been recorded from Beaumaris (Kalimnan).

Found in the polyzoal rock.

SPINES OF ECHINOIDS.

(Plate VII., Fig. 5 *a*.)

Several varieties of echinoid spines are met with in thin sections of the polyzoal rock. In their asperous surface and average dimensions they resemble the smaller secondary spines of the *Cidaris* type.

CHAETOPODA.

SPIRORBIS SP.

Two of the valves of pectens have attached to their external surface some remains of annelid tubes referable to *Spirorbis*. The tubes are not sufficiently well-preserved for description. The superior face is convex and subconical, excavate centrally and the surface of the tube transversely wrinkled, whilst a median ridge runs along the upper surface bordered by two lateral ridges. The tube varies somewhat in diameter, averaging about 1.25 mm.

The genus is mentioned by Tate* as occurring in our older Tertiary beds. The above specimens occur in the polyzoal rock.

POLYZOA—Cyclostomata.

HETEROPORA PISIFORMIS, MacGillivray.

(Plate VI., Figs. 5, 6.)

H. pisiformis, MacGillivray, 1895, Trans. R. Soc., Vict., p. 144, pl. xxi., fig. 15.

The definition of this species, which Dr. T. S. Hall furnished for the late Dr. MacGillivray's report, runs as follows:—"Zooecium nearly spherical, apparently free. Surface closely covered by rounded polygonal apertures of varying size, so that it is not evident in many cases which are zooecia and which are cancelli, as all gradations in size are present. Bounding walls of aperture stout. The apertures of all sizes usually closed by a concave porous plate placed slightly within the mouth."

Three examples were found in crushings from the polyzoal limestone of the Seal River. One was perfectly spherical, and subsequently fell to pieces owing to incipient fracture. The zoarium here figured is spherically topped, but appears to be adherent to a foreign particle at the base, so that it has assumed the shape of a fig. The third specimen was partly damaged, but still shows a clavate outline, and of this a section was made, which exhibits the curvi-radiate arrangement of the zooecia.

This species has hitherto been recorded only from Spring Creek, Torquay (Janjukian).

* Proc. Roy. Soc., N.S.W., vol. xxii., pt. 2, 1888, p. 251.

POLYZOA Chilostomata.

SELENARIA MARGINATA, T. Woods.

(Plate VII., Fig. 3.)

S. marginata, T. Woods, 1880, Trans. R. Soc., S.A., Vol. III., p. 9, pl. ii., figs. 9a-d.

The zoaria are abundant in the hard pink limestone. In thin sections of the rock they are cut in all possible directions, and show the characteristic form of the thyrostone. Where the sections cut through the apex, there is usually seen an adventitious shell or detrital fragment immersed in the apical portion. The zooecial margins are rounded, and there are numerous vibracular cells interspaced at the angles of the zooecia, of about half their size, and with a cribriform wall. A section parallel with and close to the dorsal side shows the radial areolæ to be non-porous, as in MacGillivray's var. *lucens*.*

SELENARIA CONCINNA, T. Woods.

(Plate VI., Fig. 7.)

S. concinna, T. Woods, 1880, Trans. R. Soc., S.A., Vol. III., p. 10, pl. ii., figs. 11a-e.

Sections of the entire zoarium occur in the hard pink limestone. They show the characteristic shield-shaped outline of the zooecium, whilst the apical zooecia have in some cases the projecting tongue on the proximal border, which is feebly developed in this species and more strongly shown in the allied *S. otwayensis*, Maplestone.† The elongate vibracularia cells can also be made out, more than one showing the opening with the serrate border typical of this species.

Tenison Woods recorded this form from the Kalimnan of Muddy Creek. It is also distributed in the lower beds, of Barwonian age, in Victoria (Maplestone).

AMPHIBLESTRUM (?) BURSARIUM, MacGillivray.

A. bursarium, MacGillivray, 1887, Trans. and Proc. R. Soc., Vict., Vol. XXIII., p. 66, pl. ii., fig. 2.

Idem, 1895, Trans. R. Soc., Vict., Vol. IV., p. 41, pl. v., fig. 22.

Part of a large zoarium, about 20 mm. square, from which the front walls of nearly all the zooecia have been removed. Zooecia subquadrate to elongate, alternate; more generally quadrate than in MacGillivray's figured specimens. Zooecial margins thick, granular, or furrowed.

Occurs in the polyzoal rock.

* Trans. R. Soc., Victoria, vol. iv., 1895, p. 48, pl. vii., fig. 11 (named *lucens* in text and *lucida* in explanation to plate).

† Proc. R. Soc., Victoria, vol. xvi. (N.S.), pt. ii., 1904, p. 216, pl. xxv., fig. 8.

(?) *LEPRALIA* cf. *CRASSATINA*, MacGillivray.

Lepralia crassatina, MacGillivray, 1895, Trans. R. Soc., Vict., Vol. IV., p. 74, pl. viii., fig. 4.

Our example is represented by a small cluster of encrusting zooecia, somewhat inflated, with sub-hexagonal margins. In its general characters it agrees with the above species, with the exception that many of the zooecia tend to become sub-elliptical by crowding. It has the porous front wall to the zooecium and semi-circular thyrostome as in the above form. Mr. Maplestone has pointed out to me that MacGillivray's species appears to belong more properly to *Macropora* than to *Lepralia*. A comparison may be made with *Macropora clarkei*, T. Woods sp.* That species, however, has a generally depressed or even concave zooecial wall, and the zooecia are distinctly broader than in our form. (?) *L. crassatina* occurs throughout our Tertiary series, being found in the lower beds of the Muddy Creek series, at the Moorabool River and Waurn Ponds; and is also found living off New Zealand.

Found attached to a valve of *Placunanomia* in the polyzoal rock of the Seal River.

ADEONA sp.

A portion of the branched stem which supports the flabellate zoarium occurs on the surface of one of the slabs of polyzoal limestone. It measures 40 mm. in length and 27 mm. across at the widest part, where there are nine branches.

BRACHIOPODA.

MAGELLANIA cf. *DIVARICATA*, Tate sp.

A cast of a brachiopod shell occurs in the hard pink limestone, which is referable to one or other of the closely related species *M. divaricata*, Tate sp.† or *M. garibaldiana*, Davidson sp.‡ The radial plication seen in the present example is common to both species, but the shell of *M. divaricata* is typically narrower, and shows a marked lateral compression in the region of the beak, also to be seen in our specimen.

PELECYPODA.

PINNA RETICOSA, SP. NOV.

(Plate VI., Fig. 8.)

Description.—Shell triangular, elongate. Valve moderately convex, with a strong umbonal ridge, slightly sinuous throughout its length. Antero-ventral border short and curving backward to meet the postero-ventral edge in a rounded angle. Posterior border

* MacGillivray, *op cit.*, p. 55, pl. viii., figs. 5, 6.

† (?) *Waldheimia divaricata*, Tate. Trans. Phil. Soc., Adelaide, 1880, p. 10, pl. viii., figs. 8, a, b.

‡ *Waldheimia garibaldiana*, Davidson. Geologist, vol. v., 1862, p. 446, pl. xxiv., fig. 9. *W. macropora*, McCoy. Prod. Pal. Victoria, Dec., v., 1877, pl. xliii., figs. 4, 6. *W. garibaldiana*, Dav., Tate, Trans. Phil. Soc., Adelaide, 1880, p. 7, pl. xi., figs. a-c.

transversely truncated, forming a right angle with the dorsal margin. Dorsal line slightly concave. Umbo convex and incurved to the ventral side. Dorsal slope with about nine flat longitudinal ribs crossed at fairly regular intervals by transverse flat ridges. Ventral slope marked by numerous incurved ridge-like growth lines.

Length (approximate, minus the extreme point of the umbo), 15.5 mm.; greatest width, 7 mm.

Observations.—This is a small species of *Pinna* which, in its strong convexity, narrow umbonal area, and the general outline resembles *P. cordata*, Pritchard*, with the exception that our shell is of a more oblong form. *P. reticosa* is distinct in having the dorsal ribs transversely cancellated by flat ridges parallel with the growth lines. The above form differs from *P. semicostata*, Tate,† in the relative narrowness of the proximal part of the shell, and the absence of scales on the ribs. Professor Tate has also recorded a species of *Pinna* (sp. indet.) from the Calciferous sandrock, River Murray cliffs, near Morgan, which agrees generally with the above-named species *P. reticosa*, and he gives the following description‡:—“Apical portions only known. Valves acutely angulated, with faint longitudinal ribs separated by broad interspaces on the ventral slope, crossed by undulose ridges.”

From the polyzoal limestone of Seal River, King Island.

VULSELLA LAEVIGATA, Tate.

V. laevigata, Tate, 1886, Trans. R. Soc., S.A., Vol. VIII., p. 29, pl. iii., figs. 3a, b.

A right valve, somewhat imperfect, occurs in the polyzoal rock. It is interesting to record this form in the King Island material, since it has only been noted hitherto from the lower beds at Aldinga.

PECTEN ALDINGENSIS, Tate.

P. aldingensis, Tate, Trans. R. Soc., S.A., Vol. VIII., 1886, p. 16, pl. vii., figs. 1a-c.

Two typical valves of this species are found in the present series. The larger specimen shows, towards the front margin, some distant, concentric lamellæ traversing the ribs, a character mentioned by Tate in his original description of the species.

It is interesting to find the above species in the present series, since, with the exception of Stansbury, S.A., Tate's original record appears to be the only other locality known, viz., Aldinga Bay, South Australia, in glauconitic limestone (Lower Aldingan).

Found in the polyzoal rock, Seal River.

* Proc. R. Soc., Victoria, vol. vii. (N.S.), 1895, p. 228, pl. xii., figs. 4, 5.

† Trans. R. Soc., South Australia, vol. viii., 1886, p. 29, pl. xii., fig. 9.

‡ Loc. supra cit., p. 30.

PECTEN PRAECURSOR, Chapman.

(Plate VII., Figs. 1, 2.)

P. consobrinus var. Tate, 1899, Trans. R. Soc., S.A., Vol. XXIII., p. 269.

P. praecursor, Chapman, 1912, see present Memoir (No. 4), p. 36, pl. V., figs. 1, 2, 3.

Perhaps the most abundant fossil remains in the Seal River polyzoal rock, with the exception of the polyzoa, are those of *Pecten*. Of this genus the species *P. aldingensis* is readily recognised, but the remaining specimens show a considerable diversity of ornament, partly due to the condition of the shells, so that it was somewhat difficult to settle their points of relationship. There are, however, several fairly well-preserved fragments which show that *P. praecursor* is present, and was an abundant form. One of the more perfect valves represented in the present series is nearly flat, and by the curvature of the ribs is seen to be a left valve. There are about ten or eleven primary folds with a strong median rib, on either side of which are one or two secondary ribs, and between these numerous riblets. Another specimen shows a part of the ventral margin of the valve, in which the surface ornament is particularly well-preserved. The surface of the ribs is concentrically relieved by a series of imbricating lamellæ similar to that seen on well-preserved examples of *P. antiaustralis*.* The paucity of the ribs precludes any reference to that species, and, moreover, the intercostal spaces in our specimen are distinctly of a granular shagreen character.

P. praecursor is a characteristic fossil of the lower beds at Aldinga, as well as of many localities, chiefly (or all ?) Janjukian, in Victoria. Frequent in the polyzoal rock, Seal River.

LIMA BASSI, T. Woods.

(Plate VI., Fig. 9.)

L. bassi, Tenison Woods, 1877, Proc. R. Soc., Tas. (Vol. for 1876), p. 112.

L. bassi, T. Woods, Tate, 1886, Trans. R. Soc., S.A., Vol. VIII., p. 24, pl. v., fig. 8 ; pl. viii., fig. 1.

An external mould of the shell occurs in the hard pink limestone. The ribs are rounded and transversely lamellated, and the interspaces also show fine and distinct transverse lamellæ. The shell is of the more elongate variety, common at Table Cape, and occasionally found also in the Balcombian.†

* The specimens referred to by Mr. W. S. Dun, in Mr. Debenham's paper on King Island (*op. cit.* p. 567), as a *Pecten* very closely related to *P. antiaustralis*, may possibly be referable to the above-named species, *P. praecursor*, judging from the variation of ornament seen in the present series.

† Mr. W. S. Dun has already recorded *Lima cf. bassi* from the King Island Tertiary limestone (*loc. supra cit.*).

PLACUNANOMIA SELLA, Tate.

(Plate VI., Fig. 10.)

P. sella, Tate, 1886, Trans. R. Soc., S.A., Vol. VIII., p. 9, pl. v., figs. 1a-c.

Remains of four valves of this species are found exposed on fractured surfaces of the polyzoal limestone. It is somewhat difficult to separate the two forms *P. ione*, Gray, and *P. sella*, Tate. The latter, according to Professor Tate's synopsis of characters, is distinguished by the fine radial threads, as compared with the coarse ornament of *P. ione*, whilst in the latter the radii tend to become sub-spinose. It is just possible that one of our specimens may belong rather to *P. ione*, since it measures 46 mm. in height; that of Tate's example of the same species being 47 mm.

LIST OF KING ISLAND FOSSILS, WITH NOTES ON THEIR STRATIGRAPHICAL DISTRIBUTION IN THE TERTIARIES OF SOUTHERN AUSTRALIA.

<i>Fossils.</i>	<i>Remarks.</i>
<i>Palaeachlya tuberosa</i> , sp. nov. ..	Also found in the limestone of the Moorabool Valley, at Maude.
<i>Lithothamnium</i> , sp.	Common in the polyzoal rock generally.
<i>Globigerina</i> cf. <i>bulloides</i> , d'Orbigny	Balcombian to Kalimnan.
<i>Truncatulina lobatula</i> , W. and J. sp.	Distributed throughout the Tertiaries.
<i>Truncatulina variabilis</i> , d'Orb. sp.	Barwonian.
<i>Truncatulina ungeriana</i> , d'Orb. sp.	Balcombian to Kalimnan.
<i>Isis hamiltoni</i> , Thomson ..	Previously recorded from Janjukian beds as <i>Isis</i> sp., but not specifically named.
<i>Cidaris</i> (<i>Leioeidaris</i>) cf. <i>australiae</i> , Duncan sp.	Chiefly Janjukian and Kalimnan; also from the Gellibrand River (Balcombian).
Spines of echinoids, indet.	
<i>Spirorbis</i> sp.	
<i>Heteropora pisiformis</i> , MacGill. ..	Only recorded locality, Spring Creek.
<i>Selenaria marginata</i> , T. Woods ..	Balcombian to Recent.
<i>Selenaria concinna</i> , T. Woods ..	Balcombian to Recent.
<i>Amphiblestrum</i> (?) <i>bursarium</i> , MacGill.	Balcombian to Recent.
(?) <i>Lepralia</i> cf. <i>crassatina</i> , MacGill.	Balcombian to Recent.
<i>Adeona</i> sp.	
<i>Magellania</i> cf. <i>divaricata</i> , Tate sp.	Janjukian.
<i>Pinna reticosa</i> sp. nov.	
<i>Vulsella laevigata</i> , Tate	Lower beds, Aldinga.
<i>Peeten aldingensis</i> , Tate	Lower beds, Aldinga.
<i>Peeten praeursor</i> , Chapm.	Chiefly Janjukian.
<i>Lima bassi</i> , T. Woods	Barwonian.
<i>Placunanomia sella</i> , Tate	Barwonian.

NOTE ON THE AGE OF THE BEDS.

The palæontological evidence of the foregoing limestone fossils strongly supports the idea of their Janjukian age. Therefore, from a physiographic stand-point, the King Island limestone beds were presumably continuous with those portions of the old sea-bed now represented by the Bird Rock Cliffs, the fossiliferous shell-beds of Table Cape, Tasmania, and the lower beds at Aldinga, South Australia. Not the least interesting fact brought out by the present examination of the King Island fossils is the occurrence in this fauna of two species of mollusca which have hitherto been known almost exclusively from the lower Aldinga beds of South Australia, thus showing a strong affinity in its facies with the fossils of that area. Although the present list of fossils is not so extensive for a complete comparison with other southern Australian horizons as could be desired, yet the evidence before us is fairly conclusive, since the already-known forms recorded here have all—excepting one doubtful polyzoan, which, however, is found living—been previously found in either the Table Cape beds, the Spring Creek series, or the lower Aldingan strata. Further than this, some are peculiar to the Janjukian group.

The correlation of the lower Aldingan beds with normal Janjukian strata is by no means new, since this relationship was long ago pointed out by Messrs. Tate and Dennant* in dealing with the Cape Otway series, also Janjukian. Those authors, however, included both the upper and lower beds at Aldinga which, as Messrs. Hall and Pritchard rightly point out,† belong to distinct stages. The first-named authors, in their second paper on the “Correlation of the Marine Tertiaries of Australia,” noted (*loc. cit.*) “the comparatively large proportion of Aldingan species” in the Cape Otway section. “Thus of the forty Aldinga species present at Cape Otway, eighteen are restricted to these two sets of beds,” “whilst five of the species indicated are common also to the Spring Creek Fauna.”

In my examination of this collection I am under obligations to Dr. G. B. Pritchard, F.G.S., and Mr. C. M. Maplestone for helpful suggestions regarding the mollusca and polyzoa respectively.

NOTE ON THE DUNE SAND OF KING ISLAND.‡

In addition to the previously described limestone specimens, Mr. Kershaw also handed me for examination a sample of the dune sand from Surprise Bay, King Island.

* Trans. R. Soc., South Australia, vol. xix., 1895, p. 110.

† Proc. R. Soc., Victoria, vol. xiv. (N.S.), pt. ii., 1902, p. 79.

‡ Since writing this note (May, 1909), Mr. Debenham (*op. supra cit.* pp. 564, 565) has described the physical and chemical characters of the sand dunes of King Island, and has given a chemical analysis of the sand.

This sand consists chiefly of quartz grains (well-rounded) and rolled shell-fragments in about equal proportions, together with fragmental remains of polyzoa, echinoids, and a few worn tests of foraminifera. Of the last-named group, the following species, all common to the beaches of the southern coast of Australia, were recognised :—

Miliolina vulgaris, d'Orb. sp.

Miliolina tricarinata, d'Orb. sp.

Discorbina dimidiata, Jones and Parker.

Pulvinulina repanda, Fichtel and Moll sp.

Polystomella crispa, Linn. sp.

EXPLANATION OF PLATES.

PLATE VI.

- Fig. 1.—*Globigerina* cf. *bulloides*, d'Orbigny. A median section of the test. $\times 52$.
- Fig. 2.—*Truncatulina ungeriana*, d'Orbigny, sp. (stout var.): (a) Superior aspect; (b) inferior aspect; (c) peripheral aspect. $\times 52$.
- Fig. 3.—*Mopsea hamiltoni*, Thomson: (a) Lateral aspect; (b) articular surface. $\times 3$.
- Fig. 4.—*Mopsea hamiltoni*, Thomson. Lateral aspect of another example. $\times 3$.
- Fig. 5.—*Heteropora pisiformis*, MacGillivray. $\times 10$.
- Fig. 6.—*Heteropora pisiformis*, MacGillivray. Vertical section of a pyriform zoarium. $\times 26$.
- Fig. 7.—*Selenaria concinna*, T. Woods. A thin section in limestone, taken tangentially to the zooecial surface; showing vibracular and zooecial cells. $\times 52$.
- Fig. 8.—*Pinna reticosa*, sp. nov. $\times 2$.
- Fig. 9.—*Lima bassi*, T. Woods. A portion of the shell surface; from a wax squeeze of a mould in limestone. $\times 3$.
- Fig. 10.—*Placunanomia sella*, Tate. Nat. size.

Note.—Figures 2–6, 8, and 10 are from the polyzoal limestone of the Seal River; the remainder are from the hard limestone of the same locality.

PLATE VII.

- Fig. 1.—*Pecten praecursor*, Chapm. From the polyzoal rock. Nat. size.
- Fig. 2.—*P. praecursor*, Ch. Another specimen showing tegulate ornament on the marginal part of the valve. Polyzoal rock. Nat. size.
- Fig. 3.—*Selenaria marginata*, T. Woods. A tangential section including apical region. From the pink limestone. $\times 14$.
- Fig. 4.—*Palaeachlya tuberosa*, Chapm. The organism perforating a worn shell-fragment. From the pink limestone. $\times 164$.
- Fig. 5.—Thin section of the polyzoal rock, showing a cidaroid spine, numerous polyzoa, and the granular calcitic groundmass. $\times 14$.
- Fig. 6.—Thin section of the pink limestone, showing polyzoa, shell-fragments, and foraminifera (*a* = *Truncatulina variabilis*), embedded in a fine pasty calcitic groundmass. $\times 14$.

NOTE ON FIJIAN CLUBS ORNAMENTED WITH MAORI PATTERNS.

*By R. H. Walcott, F.G.S., Curator of the Geological and
Ethnological Collections.*

(Plate VIII.)

During a visit to the Museum, Professor R. B. Dixon, of the Anthropological Department of the Harvard University, was particularly interested in a Fijian club bearing an incised design of distinctly Maori origin. Professor Dixon had previously seen elsewhere two other specimens ornamented with a similar type of design, and as, apparently, no record had been made of such an interesting instance of borrowed art, it is well that the Museum should publish a description of the specimen in its collection.

I was fortunate enough, on mentioning the subject to Mr. W. H. Schmidt, of the Australian Metal Company, Melbourne, to find that he had in his private collection another example of a club decorated in a similar manner, which he kindly offered to lend for description.

The Museum specimen, Reg. No. 14,870 (Fig. 1), is, apart from its ornamentation, an ordinary Fijian club of the cylindrical type. Its total length is 3 feet $7\frac{3}{4}$ inches, with an approximate diameter of $1\frac{3}{8}$ inches for 23 inches of its length from the end of the handle. It then gradually increases in diameter to the termination of the head, where it attains a maximum of $1\frac{7}{8}$ inches.

The end of the handle is hollowed out to a depth of a quarter of an inch, a feature not uncommon in Fijian clubs.

The incised design on the handle extends from the extreme end for $11\frac{3}{4}$ inches without a break, and from its termination to the end of the head, seven bands, about three-quarters of an inch wide, of the same incised design are unequally spaced.

The specimen was acquired from Mr. W. Simmonds, of Melbourne, in March, 1908, by whom I have been informed that it was collected by himself some thirty or more years before. Mr. Simmonds, who made a number of visits to Fiji, was unfortunately unable to recollect under what circumstances he obtained the club, or from which island of the group.

The style of ornamentation is common in Maori carvings, and consists, as may be seen from Fig. 2, which is a reproduction of a rubbing, of a series of transverse parallel bands each of four lines, alternating with single lines of diamond-shaped points. The bands of parallel lines do not continue unbroken round the whole

circumference of the club, but at some place or places in their length bend sharply either upwards or downwards to meet the adjacent band. Interspersed among these are six link-like ornaments, five resembling the stud links of a ship's cable, and the sixth resembling two long plain links. They are arranged longitudinally with reference to the greater axis of the club, or at right angles to the main design, which they resemble in principle, but they are composed of three lines instead of four, as in the transverse bands of the main design.

It seems evident that this type of ornamentation is derived from the spiral, so characteristic of Maori art, and only resembled at all by the scroll pattern prevalent in New Guinea decoration.

Mr. A. Hamilton,* Director of the Dominion Museum, Wellington, N.Z., was informed by an old Maori that the spiral, called *pitau*, represented the young circinate frond of the tree fern, *pitau* being the Maori term applied to the young frond of the tree fern (*Cyathea*).

The small studs between the coils of the spiral in the carvings represent the pinnæ of the frond. The five links in the design on the club are plainly only the elongated first or central coil of the spiral, with one end continued and closed on the central coil, while in the double links both ends are continued and closed.

The transverse bands are simply a further elongation of the same coil, although their origin is not so apparent. The diamond-shaped points forming lines between the bands and in the links take the place of the studs in the spiral.

Mr. Schmidt's specimen (Fig. 3), which has no available history, he having purchased it from a dealer in Prahara, a suburb of Melbourne, is what is commonly known as the pineapple type among Fijian clubs, on account of the head bearing a resemblance to that fruit.

As in the previous specimen, there is also nothing in the form of this club which shows any departure from the type it represents.

The ornamentation (Fig. 4) is restricted to $8\frac{1}{2}$ inches of the handle, the rest being perfectly plain. With the exception of a central transverse band, the ornamentation is in the main similar to that just described.

These minor differences consist in most of the four lined bands being curved, and not bent to meet the adjacent ones. The distance between the bands is also greater, so that the diamond-shaped points of the other club here rather assume the character of short longitudinal ridges, and in the two lower links they are replaced by U-shaped forms. The links, of which there are four, are all double, while in the Museum specimen, as pointed out, there is only one of this kind.

* Maori Art, Part I., p. 11, 1896.

The transverse band near the centre of the design, referred to above (Fig. 4), is about three-quarters of an inch wide, and consists of a triangular pattern of closely placed lines. The style of this decorative band seems to be more characteristic of Fijian than of New Zealand ornamentation.

With regard to the origin of Maori ornamentation on Fijian articles, it is a matter of some difficulty to decide to what circumstances it is due.

Accepting the theory that Maori art is endemic, it having been evolved since the isolation of the Maoris from the rest of the world after the last great migration about the year 1350, and was not brought with them from their original home, it cannot be said that that found in Fiji represents the remnant of a type originally derived from a common source and distributed throughout many islands in the Pacific visited and colonized by the early Polynesians.

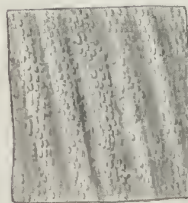
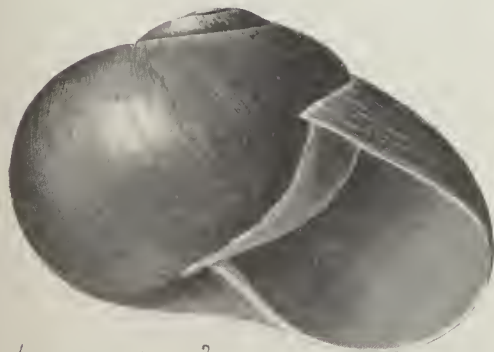
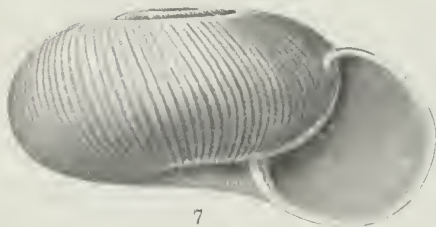
No intercourse, then, having taken place between the Maoris and other peoples of the Pacific since the evolution of their art, its introduction into Fiji can best be explained by attributing it to communication between the two places, which commenced with the European whalers and traders at the beginning of last century.

There is, however, a possible explanation which may refer its introduction into Fiji to earlier times, and which was suggested by pieces of a New Guinea canoe in the Museum, said to have been picked up on the coast of New Zealand. It is that, in like manner, a Maori canoe may have been driven out of its course and eventually stranded on one of the islands of the Fijian Group, where either the designs on the canoe were copied by the inhabitants, or the characteristic form of carved decoration was made known to them by some of its Maori survivors.

If by this explanation its origin can be referred to a period antedating the advent of the European, the fact may possibly be ascertained by the type of weapon, or some feature in the carving, differing from that of more modern times. There is nothing in the types represented by the two clubs under consideration, or in their condition, to suggest antiquity; and with reference to their ornamentation, I am not in a position to give an opinion as to any variation in the detail of the work which may offer a clue; but I believe Professor Dixon held the view that some such evidence of antiquity did exist in the Museum specimen. On the other hand, it may only mean that the ornamentation, used originally as a pattern, was of ancient design.

Failing proof of antiquity, it appears to me that the ornamentation most probably originated either by articles brought from New Zealand to Fiji by missionaries, traders, or whalers, or else by some of their Maori sailors decorating the weapons of the Fijians with the New Zealand patterns.

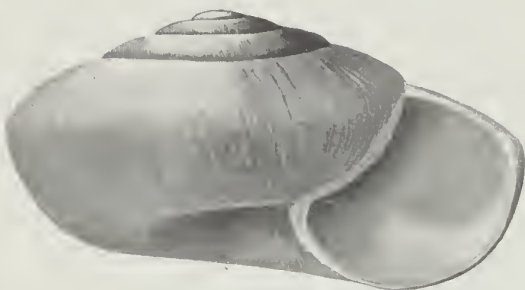
In this way the Maori type of ornamentation may have become known to the Fijians, and, perhaps, adopted by them at times, as offering a pleasing variation on their own well-known designs; but it is not even certain that its introduction can be put back as far as is suggested, and it may only date from about forty or fifty years ago, when a rapid influx into Fiji from the Australasian Colonies took place.



Winifred W. St. ³



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Winfred Frost



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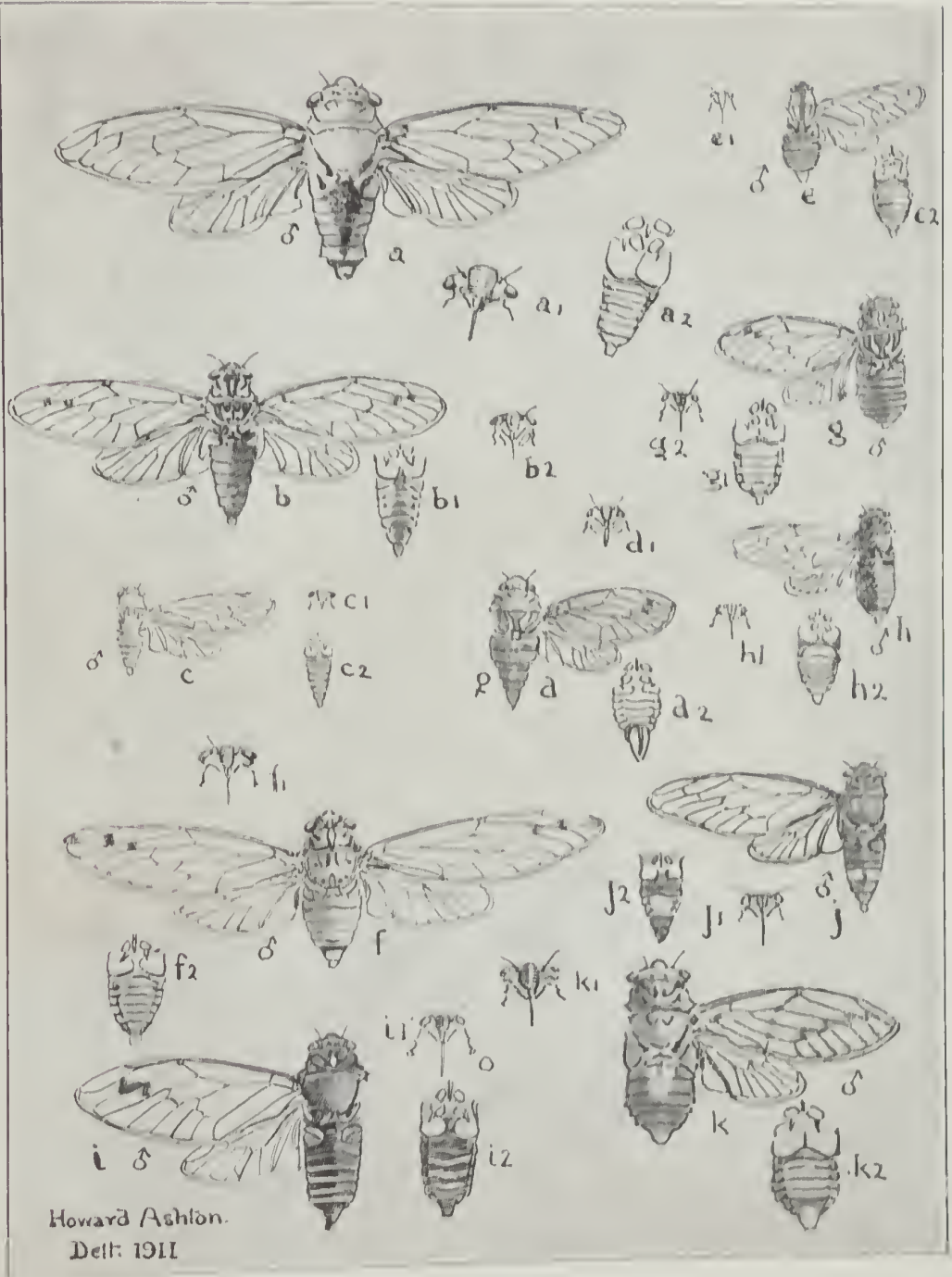


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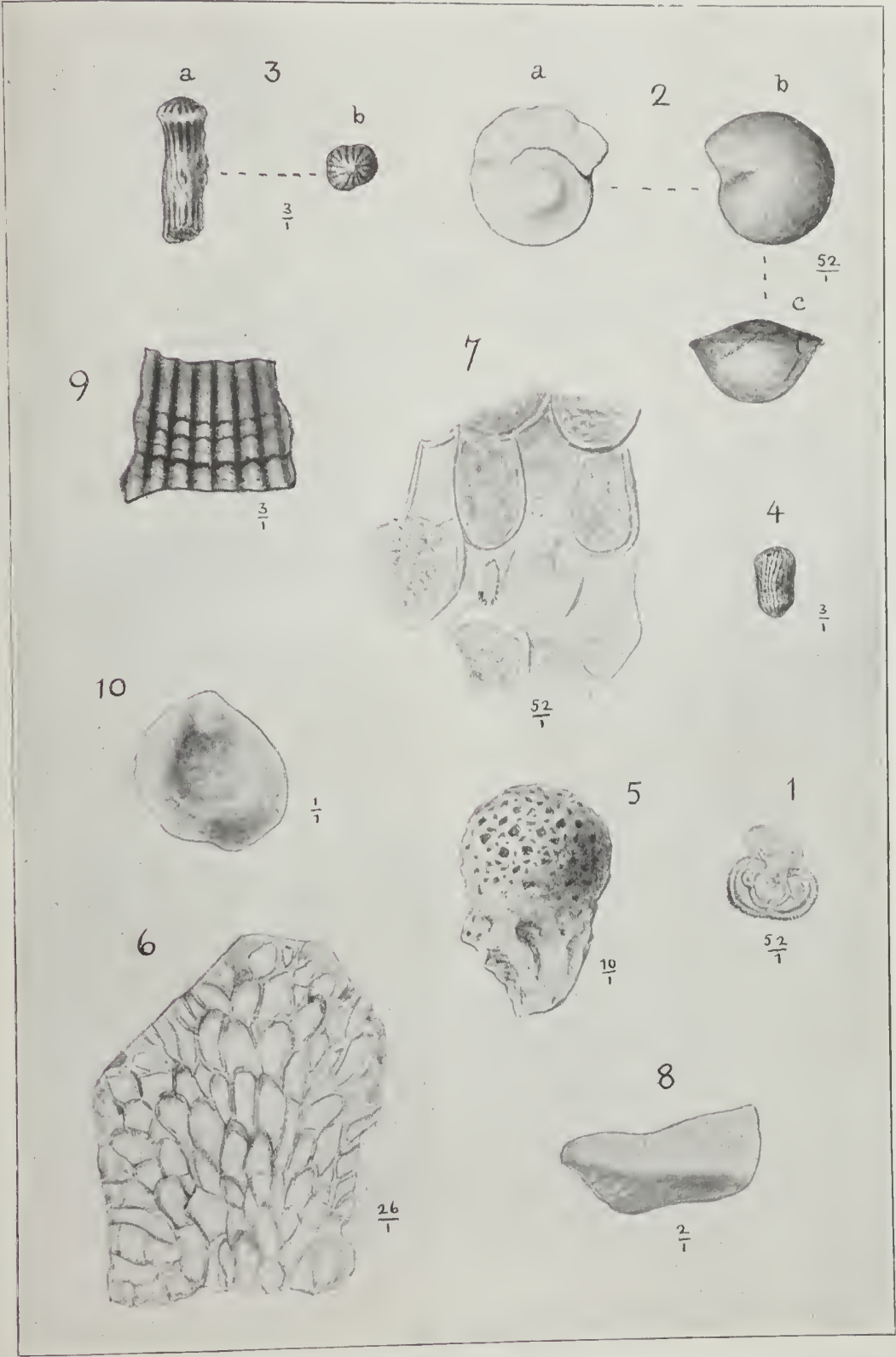
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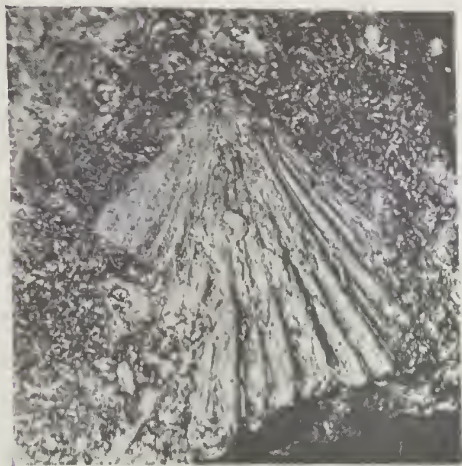
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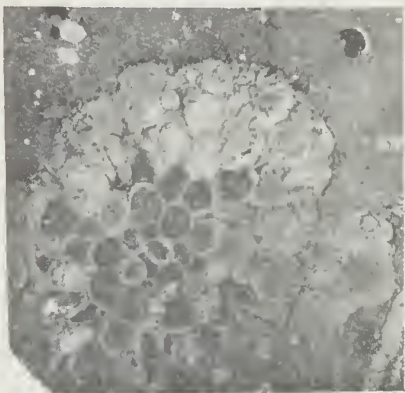




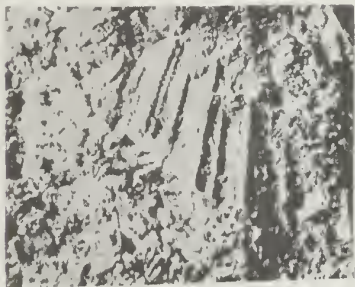
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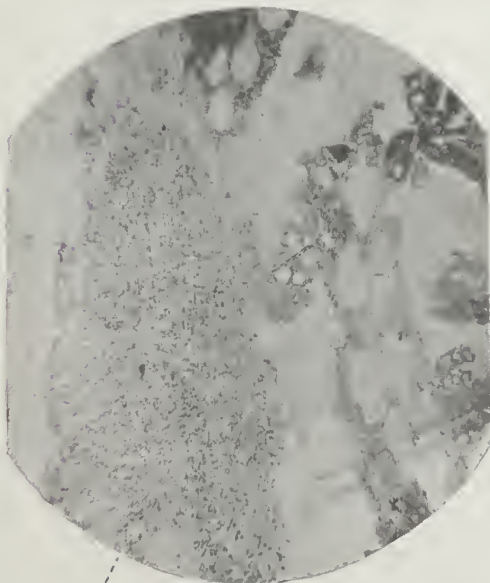
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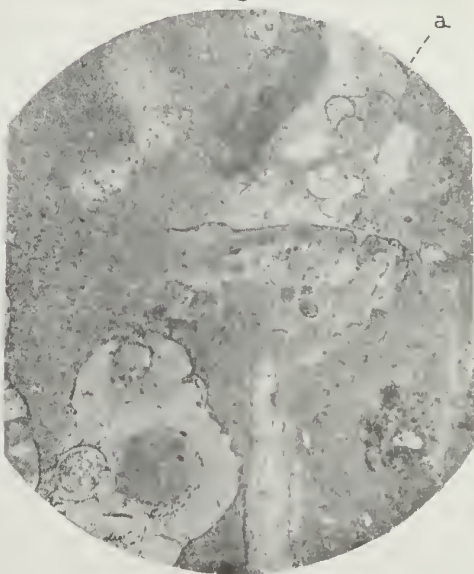
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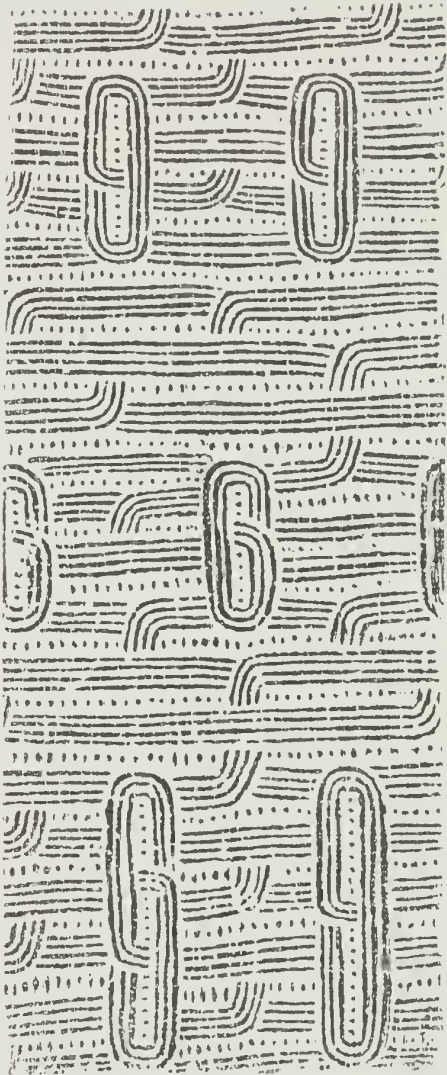


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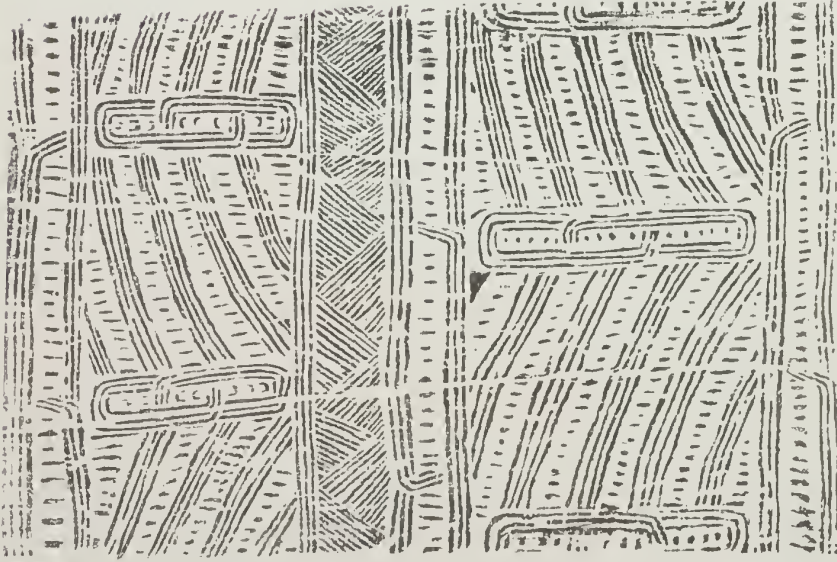




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